Chapter 6

Natural Resources

NATURAL RESOURCES

LAND COVER AND DEMOGRAPHICS

Indicator 1. Land Cover and Demographics

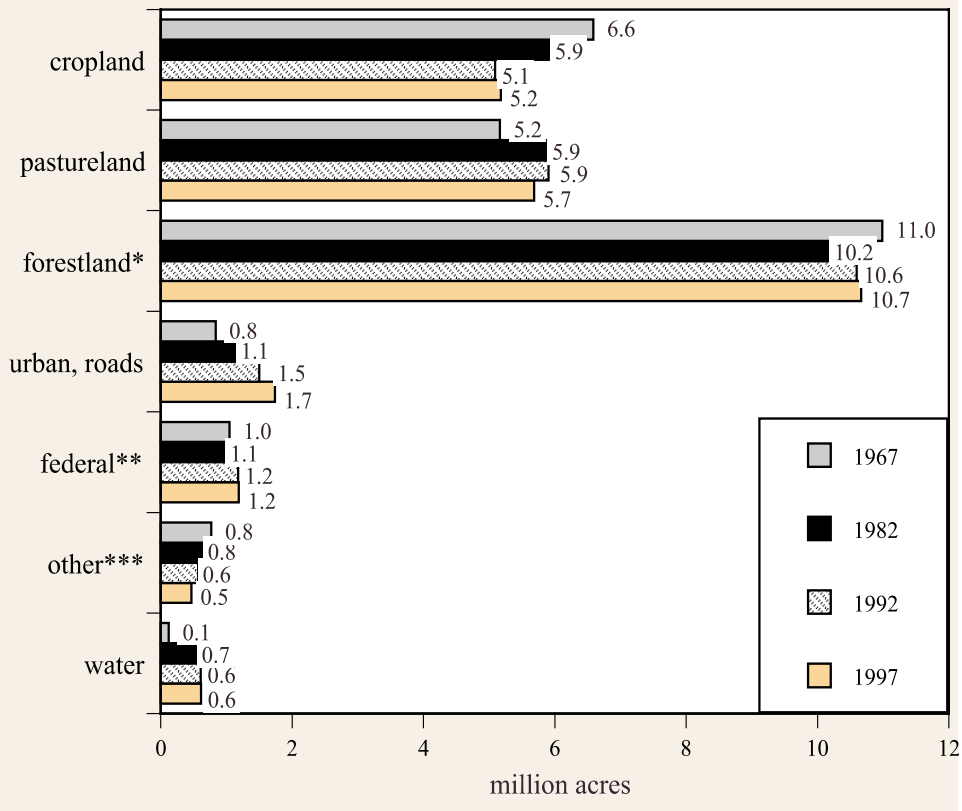
Background Kentucky's landscapes are the most varied in the Eastern United States, encompassing mountains, rolling lowlands and flat plains.[1] The 25.6 million acres of land in Kentucky is composed of crop and pastureland (42 percent); private, municipal, state and county forests (42 percent); urban areas and roads (7 percent); federal lands including the Daniel Boone National Forest, Land Between the Lakes National Recreation Area and military bases (5 percent); with the remainder in surface water and other areas.[2]

Use and management of Kentucky's land constantly changes in response to demographic and economic factors. These forces have created some of the most hotly contested issues facing the Commonwealth today, including the siting of new power plants and large poultry farms as well sprawling unplanned development that gobbles up huge tracts of farmland and forests.

Goal Assure the development of public and private property in the most appropriate relationships (KRS 100.183).

Progress Kentucky is a largely rural state. The state remains number one in the nation for the number of farms. But the farm economy has witnessed hard times during the past 3 decades, and Kentucky farmland has declined by 900,000 acres. Some of this land has reverted back to forests. Kentucky gained half a million acres in forestland between 1982 and 1997. However, the greatest percent change in land use patterns during the three decades can

Measure 1. Land Use Patterns in Kentucky



At a Glance

Kentucky population
1990 3,685,000
2000. 4,041,769

Percent land use
farmlands* 42%
forests**. 42%
urban/road 7%
federal*** 5%
other 4%

Acres per day in Kentucky converted to urban areas. 109

Counties with land use planning 48

Communities with independent planning units 78

**Crop and pastureland in active use.*
***Private, municipal, state and county-owned forestlands.*
****National parks and national forests, military bases.*

Land Cover and Demographics

be seen in the growth of urban areas and roads.

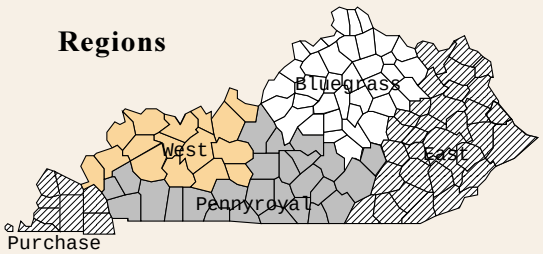
The acres of land converted to urban areas and roads more than doubled between 1967 and 1997, a reflection of Kentucky's growing population and economy. The 2000 census set Kentucky's resident population at 4,042,760, a 9.7 percent increase over the 1990 population. In the 1990s, Kentucky's population grew almost 14 times faster than it did in the 1980s. Much of the growth occurred along interstate highways and in suburban areas outside cities.[3] Kentucky added nearly a quarter-million homes during the 1990s. The growth rate for housing (18 percent growth rate between 1990 and 2000) exceeded the population growth of 9.7 percent, with 1.75 million houses, apartments, cabins and mobile homes. Much of this growth has occurred in Kentucky's "golden triangle" encompassing Lexington, Louisville and Northern Kentucky. Spencer County saw the greatest growth with a 73 percent increase in population and housing, followed by Boone County (49 percent population and 55 percent housing).[4] Many Kentuckians are also flocking to the state's scenic lakes and forests. The number of seasonal or recreational homes in Kentucky jumped 45 percent in the 1990s.[5] Menifee County saw a 53 percent increase in homes, 24 percent of which were vacation homes near the Daniel Boone National Forest.[6]

On average, 109 acres a day are converted to urban areas and roads in Kentucky.[7] A study by the American Planning Association found that between 1982 and 1997, Kentucky developed its land more rapidly per capita than any other state, with the exceptions of Pennsylvania and West Virginia. According to the association, an average of 47,793 acres of land were developed annually in Kentucky during this period. In the Bluegrass region, urban land grew by 60 percent between 1982 and 1997 while pas-

Measure 2. Regional Land Use Trends in Kentucky

Region	1982 acres	1992 acres	1997 acres	1982 - 97 % change
East				
cropland	333,900	216,700	246,100	-26.3
pastureland	743,900	1,031,800	1,066,200	43.3
forestland*	5,465,100	5,205,200	5,165,700	-5.5
urban	240,100	336,300	379,300	58.0
federal**	781,700	857,200	857,200	9.7
water	86,100	90,300	90,400	5.0
other***	228,900	142,200	74,800	-67.3
Bluegrass				
cropland	1,348,400	1,183,100	1,226,900	-9.0
pastureland	2,534,200	2,308,600	2,089,300	-17.6
forestland*	1,158,500	1,390,400	1,443,200	24.6
urban	418,200	566,700	670,200	60.3
federal**	14,400	13,300	13,300	-7.6
water	106,800	112,600	114,400	7.1
other***	85,200	88,400	106,900	25.5
Pennyroyal				
cropland	1,738,800	1,601,400	1,602,000	-7.9
pastureland	1,622,800	1,595,600	1,560,600	-3.8
forestland*	1,877,100	1,901,100	1,890,400	0.7
urban	233,600	293,100	343,300	47.0
federal**	230,000	263,000	246,300	7.1
water	170,300	173,400	174,600	2.5
other***	92,700	92,600	98,900	6.7
West				
cropland	1,709,600	1,480,100	1,457,000	-14.8
pastureland	837,100	769,300	775,800	-7.3
forestland*	1,555,700	1,685,800	1,757,200	13.0
urban	173,000	205,000	230,700	33.4
federal**	65,300	65,000	65,000	-0.5
water	118,400	123,000	125,900	6.3
other***	256,900	201,200	141,900	-44.8
Purchase				
cropland	803,500	610,200	646,200	-19.6
pastureland	221,400	196,700	193,600	-12.6
forestland*	388,100	416,300	410,500	5.8
urban	80,400	99,300	114,000	41.8
federal**	5,400	5,400	5,400	0.0
water	102,000	105,300	106,000	3.9
other***	35,900	41,800	42,000	17.0

Regions



ture and cropland declined by 27 percent.[8]

The most recent economic boom, which began in 1992 and has been the longest in U.S. history, has helped to fuel economic expansion and growth across the Commonwealth. Kentucky's gross state product (GSP) has increased every year since 1986 (using 1996 constant dollars). Kentucky's GSP exceeded $100 billion in 1997.[9] Real GSP grew 34 percent between 1990 and 1998.[10] However, this expansion may end this year based on state projections.

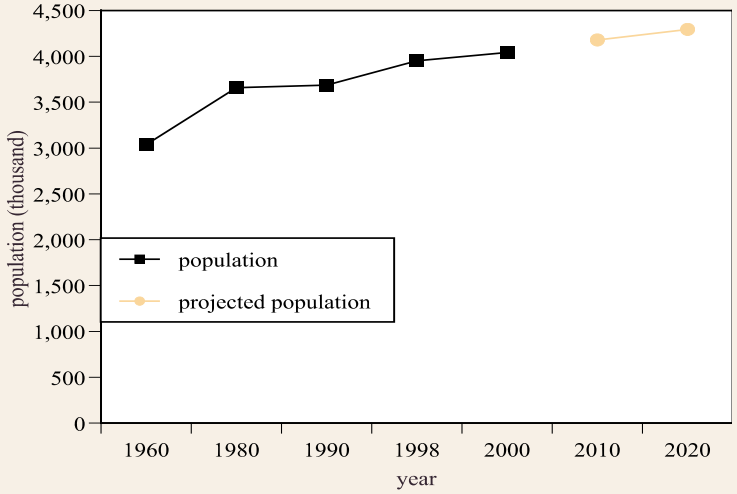
Economic and suburban growth have created numerous land use conflicts across the state. Only 48 of Kentucky's 120 counties have countywide planning; 26 also have zoning. Another 78 communities have independent planning units. But that still leaves many communities without the proper tools to adequately plan for and address the many issues associated with urban sprawl and development.

In the 2000 and 2001 sessions of the General Assembly, several bills were introduced to address growth issues. Most notable was House Bill 524, filed in the 2001 Session, which provided incentives for counties to adopt comprehensive "smart growth" policies and encourage regional coordination to ensure compatible growth policies.[11] However, the measure was not considered during the session.

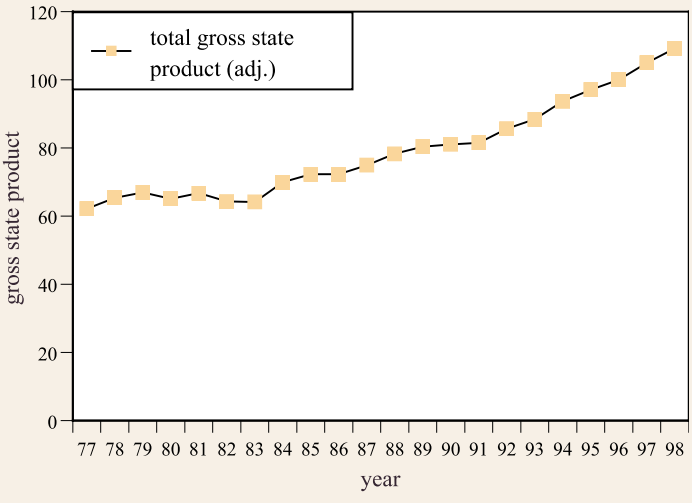
Smart growth recognizes connections between development and quality of life. It leverages new growth to improve communities while also preserving open space and many other environmental amenities.[12] The smart growth movement seeks to clean and recycle inner city brownfields while concentrating growth within existing city neighborhoods instead of the suburbs. It also promotes new sustainable urban neighborhoods where housing, circulation, schools, shopping, public open space, libraries, recycling, and composting are well designed and integrated.[13] On May 17, 2001, Gov. Patton announced the formation of a Smart Growth Task Force. The task force is charged with developing options to incorporate smart growth policies within state and local government operations.

One bill related to smart growth that was passed during the 2001 Kentucky legislative session was the "Voluntary Environmental Remediation Act," better known as the brownfields bill. Brownfields are abandoned, idle, or under-used industrial or commercial facilities where redevelopment is complicated by environmental contamination. Many sites that were once used for industrial purposes have been abandoned, and potential developers are reluctant to use these sites because of the liability they pose for any contamination that may be

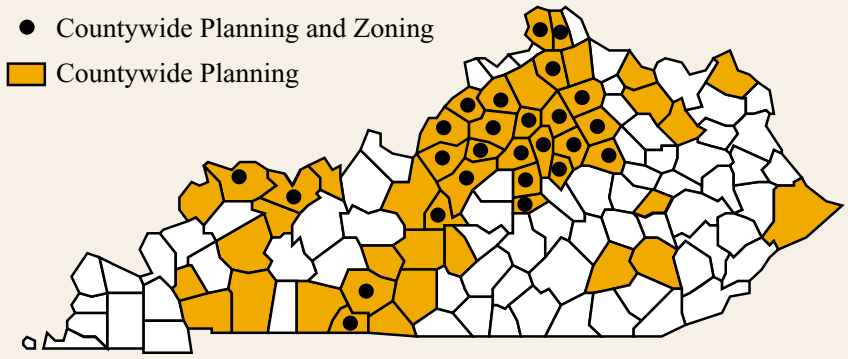
Measure 3. Population Trends in Kentucky



Measure 4. Economic Trends in Kentucky



Measure 5. County Land Use Planning in Kentucky



present on the site. Developers are more attracted to sites in pristine, undeveloped areas to avoid liability issues. Development of these undeveloped sites, termed "greenfields," contributes to urban sprawl and unplanned urban expansion. The legislation builds on existing law to define the process to identify and manage or remove contaminants at brownfield sites. Provisions of the bill also address owner liability issues associated with brownfield redevelopment.

Footnotes

1. Kentucky Alive, Report of the Biodiversity Task Force, 1995.
2. 1997 National Resources Inventory: Highlights, U.S. Natural Resources Conservation Service.
3. "State grew much faster in the 1990s than in 1980s," Peter Baniak, Lexington Herald-Leader, December 12, 2001.
4. "State's housing boom," by John Cheves, Lexington Herald-Leader, May 23, 2001.
5. Ibid.
6. Ibid.
7. Based on a gain of 595,600 acres of urban areas and roads from 1982 to 1997 as determined by the Natural Resources Conservation Service National Resources Inventory, Web site - http://www.ky.nrcs.usda.gov/nri/change.htm.
8. Natural Resources Inventory 1982 to 1997, Natural Resources Conservation Service.
9. In real dollars.
10. Ky. Department for Economic Development, Bureau of Economic Analysis.
11. Bill summaries, Legislative Research Commission, Web site - http://www.lrc.state.ky.us.
12. Why Smart Growth: A Primer by International City/County Management Association, by Geoff Anderson, July 1998.
13. "Who Benefits From Smart Growth?," By Faisal Roble, city planner Los Angeles, Planners Network Online, Nov. 1999.

Measures - notes and sources

***Measure 1**. Data differs from the 1996-97 State of the Environment report due to revisions/enhancements that have been made by the statiticians at Iowa State University and Washington DC. In addition to this, an error in the statistical software was identified back in December, 1999. The error was corrected and the official data re-released in December, 2000. *Private, municipal, county and state forestlands. **Federal lands including national forest and parkland and military bases. ***Farmsteads and other land in farms (i.e. greenhouses, nurseries, poultry facilities), barrenland (i.e. strip mines, quarries), and marshland. Source: U.S. Natural Resource Conservation Service.*
***Measure 2**. Data differs from the 1996-97 State of the Environment report due to revisions/enhancements that have been made by the statiticians at Iowa State University and Washington DC. In addition to this, an error in the statistical software was identified back in December, 1999. The error was corrected and the official data re-released in December, 2000. *Private, municipal, county and state forestlands. **Federal lands including national forest and parkland and military bases. ***Farmsteads and other land in farms (i.e. greenhouses, nurseries, poultry facilities), barrenland (i.e. strip mines, quarries), and marshland. Source: U.S. Natural Resource Conservation Service.*
***Measure 3**. Source: U.S. Census, Ky. State Data Center.*
***Measure 4**. Adjusted using the chained type quantity index for GSP using 1996 as the base year. The chained dollar method is the most contemporary accepted measure of gross state product utilized to generate inflation-free estimates. Sources: Ky. Cabinet for Economic Development, U.S. Department of Commerce, Bureau of Economic Analysis.*
***Measure 5.** Source: Ky. Chapter of the American Planning Association.*

Indicator 2. Agricultural Lands and Products

Background While Kentucky's population continues to shift to urban areas, the state remains primarily an agricultural land. In 1999, farmlands covered an estimated 42 to 54 percent (10.9 to 13.6 million acres) of Kentucky's land area.[1] About half of this acreage is in crop production, and half is in pastureland. Farmlands range from a high of 309,000 acres in Christian County to a low of 2,230 in Martin County. Most farms are located in the central and western parts of the state.[2]

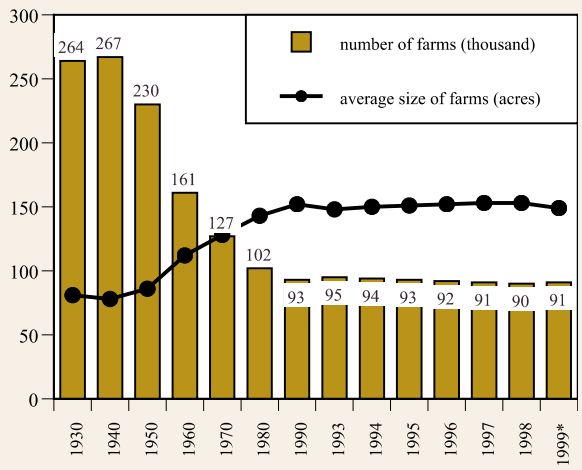
Kentucky ranks 4th in the nation in the number of farms. Primary responsibility for the stewardship of Kentucky's 91,000 farms is in the hands of small family farmers.[3] Nearly 75 percent of Kentucky's farms (61,860) range from 1 to 179 acres.[4] Although the number of farms has decreased during the past decade, the average size has increased to 151 acres in 2000, likely due to the consolidation of farmland by fewer landowners.[5]

Kentucky farms produce numerous goods and services and are the state's largest industry, generating nearly $3.5 billion in sales during 1999. Crop sales totaled $1.3 billion, and livestock sales generated $2.16 billion. Tobacco is the leading agriculture crop in Kentucky, followed by hay, corn, soybeans and winter wheat. Kentucky farm s also produce livestock, including horses, cattle and calves, milk cows, hogs and pigs, and poultry. Kentucky has more cattle than any state east of the Mississippi River. Other products include eggs, plants and foliage, fruits and vegetables, and bees and honey.

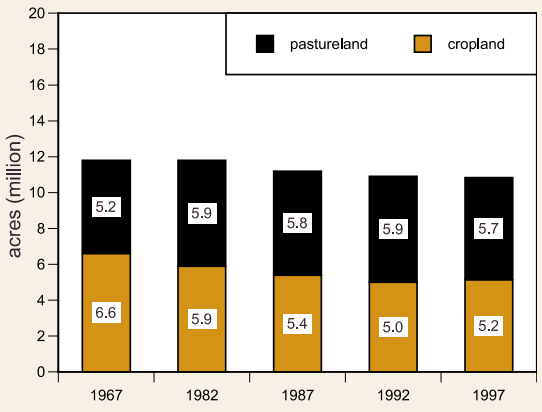
Goal To conserve, protect and to encourage development and improvement of the state's agricultural lands for the production of food and other agricultural products.

Progress Kentucky agriculture has witnessed much change during the past century. Kentucky's largest cash crop, tobacco, continues to face uncertainty about its future. The number of general family farms has declined as farming has become more

Measure 1. Number and Average Size of Farms in Kentucky



Measure 2. Crop and Pastureland in Kentucky



At a Glance

Acres of farmland in Kentucky (million acres)
1967. . . . . .11.8
1987. . . . . .11.2
1997. . . . . .10.9

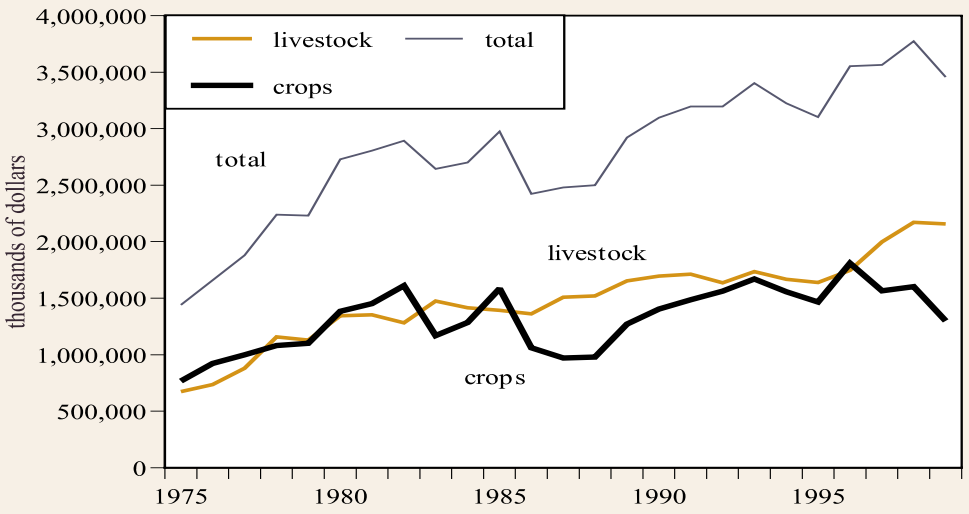
Number of farms in Kentucky
1970. 127,000
1980. 102,000
1999. 91,000

Number of small family farms in Kentucky (1 to 179 acres)
1982 78,641
1987 69,616
1997. 61,860

Cash receipts generated by farms in Kentucky
1970 . . . . . .$77 million
1980 . . . . . .$2.7 billion
1999 . . . . . .$3.5 billion

Agricultural Land

Measure 3. Kentucky Cash Receipts from Kentucky Farms



specialized and more commercially driven. Farm acreage continues to shift to other uses with urban sprawl and development claiming thousands of acres of farmland. Environmental issues associated with "concentrated animal feeding operations" (CAFOs) have become a concern in the state, in response to the growing broiler industry. In Kentucky, broiler production increased from 64.5 million in 1995 to 188.8 million in 1999.[5]

Efforts to address the many challenges confronting Kentucky farmers and the state's agricultural lands are ongoing. In July 1998, Gov. Paul Patton established the Governor's Commission on Family Farms to focus exclusively on the interests of Kentucky's farm families and rural communities. The commission has worked on marketing assistance, diversification, labor assistance, urban / rural partnerships and infrastructure and market development for new crops and products.

Kentucky is also moving forward in exploring new opportunities for farms through the use of tobacco settlement monies. The state will receive $180 million in monies over the next two years from a trust established by several tobacco companies as part of a $206 billion court settlement with 46 states.[6] The Kentucky Agricultural Development Board was created by the 2000 General Assembly to administer and distribute the tobacco settlement monies. The board will invest these funds in innovative proposals that increase net farm income and are designed to help tobacco farmers and communities.

Footnotes

__1__. Kentucky Agricultural Statistics Service indicates that 13.6 million acres of land are covered by crop and pastureland based on the Kentucky Agricultural Statistics 1999-2000, while the Natural Resources Conservation Service reveals that 11.9 million acres are in crop and pastureland based on its 1997 Natural Resources Inventory.

__2__. Kentucky Farm Count by Congressional District, 1997 Census of Agriculture, Web site - http://www.nass.usda.gov/census/census97/congdist2/states/kentucky/ky.htm.

__3__. "Kentucky Farm Numbers Down In 2000," Press release, 2/26/01, Ky. Agricultural Statistics Service.

__4__. Ibid.

__5__. Kentucky Agriculture Statistics 1999-2000, page 70, Ky. Agricultural Statistics Service.

__6__. History of the National Tobacco Growers Settlement Trust, Commonwealth of Ky., Web site - http://kytobaccotrust.state.ky.us/History.htm

Measures - notes and sources

Measure 1. **1999 numbers are estimates. Farmland defined as a place that sells or could sell $1,000 of agricultural products during the year. Source: U.S. Census of Agriculture, 1950-1945; U.S. Department of Agriculture National Agriculture Statistics 1950-2000.*

Measure 2. **Farmland is defined as a place that sells or could sell $1,000 of agricultural products during the year. Source: U.S. Department of Agriculture, National Resource Inventories, 1967-97.*

Measure 3. *Source: Ky. Agricultural Statistics Service, Ky. Agricultural Statistics 1999-2000.*

Indicator 3. Farmland Preservation

Background Kentucky's farmlands continue to be lost to development and other uses. Between 1967 and 1997, Kentucky lost 8 percent (900,000 acres) of its farmlands to other uses.[1] Kentucky's prime farmland, those acres with best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops, continue to declined as well. The amount of prime crop and pastureland in Kentucky fell from 5.26 million acres in 1982 to 4.707 million acres in 1997, a drop of 553,000 acres. Data reveals a loss of prime crop and pastureland between 1982 and 1997 of 85,000 acres.

Goal To conserve, protect and encourage development and improvement of the state's agricultural lands for the production of food and other agricultural products.

Progress Several programs have been created to provide incentives to protect farmlands from conversion and keep these lands in agricultural use. The Kentucky Agricultural District Program was created in 1982. Since then 2,551 landowners in 63 counties amounting to 322,188 acres have been enrolled in the program.[2] The advantages of participating in the program include lower property value assessments (which reduce taxes) and protection from annexation when cities expand into rural areas.

Purchase of Agricultural Conservation Easements (PACE) was established by the General Assembly in 1994. The program authorizes the state to purchase agricultural conservation easements in order to ensure that lands currently in agricultural use will not be converted to other uses. The PACE program has received $2.3 million in state and federal funds to purchase agricultural conservation easements. An additional $10 million in funding was made available by the 2000 Kentucky General Assembly as part of the tobacco settlement agreement. To date, 14 easements have been purchased (3,388 acres). Six farmers have also donated easements of 1,020 acres, bringing the total PACE Program inventory to 4,408 acres.[3] Negotiations are currently underway on five more farm easements totaling 2,128 acres.

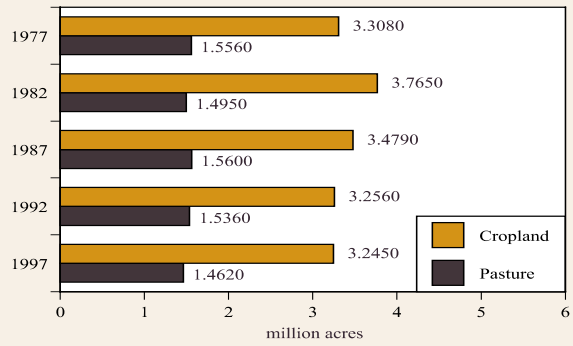
In 2000, the Lexington-Fayette Urban County Government initiated a purchase of development rights program to protect farmland. The goal of the program is to preserve more than 50,000 acres of rural land in Fayette County. The program is funded by state and local money, $15 million coming from the Kentucky Agricultural Development Bond Fund and approximately $25 million coming from local bonds. To date, 36 farmers have submitted applications totalling 6,700 acres.[4]

At a Glance

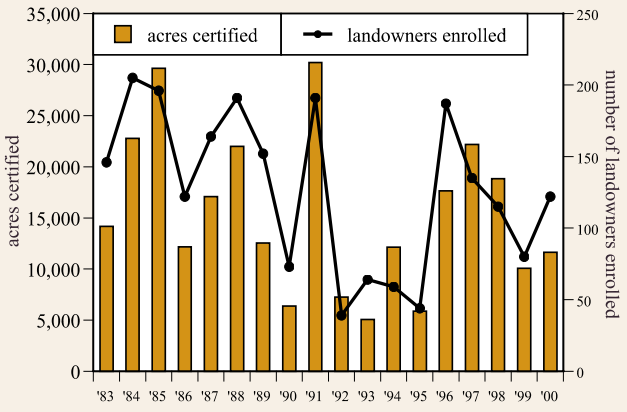
Prime crop and pastureland in Kentucky (million acres)
1977. . . . . .4.864
1982 . . . . . 5.260
1987. . . . . .5.039
1992 . . . . . 4.792
1997. . . . . .4.707

Agricultural lands protected (acres)
Ag. districts. . .322,188
PACE easement . .4,408

Measure 1. Prime Crop & Patureland in Ky.



Measure 2. Agriculture District Program in Ky.



Footnotes

1. 1997 National Resources Inventory, U.S. Natural Resources Conservation Service, 2000 .
2. Ky. Division of Conservation.
3. Ky. Department of Agriculture, 2001.
4."Waiting for the Green," Laura Oppenheimer, Lexington Herald-Leader, February 1, 2001.

Measures - notes and sources

Measure 1. *Source: National Resources Inventory 1977-1997, U.S. Department of Agriculture.*
Measure 2. *Source: Ky. Division of Conservation.*
Measure 3. *Source: Ky. Division of Conservation.*

Farmland Conservation

Indicator 4. Farmland Conservation

At a Glance

Farmlands needing conservation treatment
1982. . . . . 6,790 acres
1992. . . . . .5,893 acres
1997 . . . . . not available

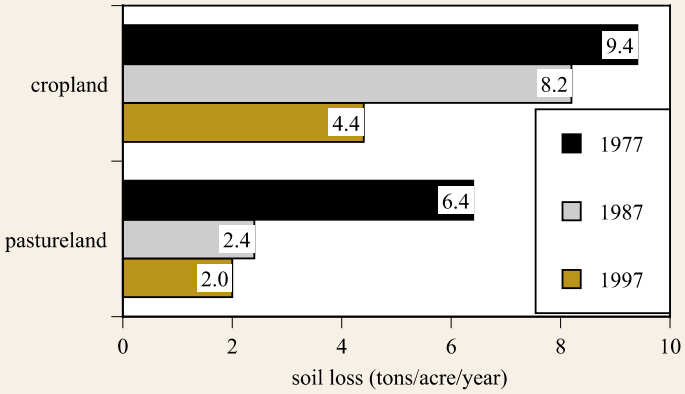
Farmland using conservation tillage (acres)
1982 . . . . . .3 million
1997 . . . . . 3 million
2000. . . . . 2 million

Background There are a number of factors that affect farmland productivity including weather, insects, disease, seed quality and soil conditions. New technologies and products, particularly fertilizers, pesticides and improved seed varieties, have greatly increased crop yields and production levels of Kentucky's cash crops.

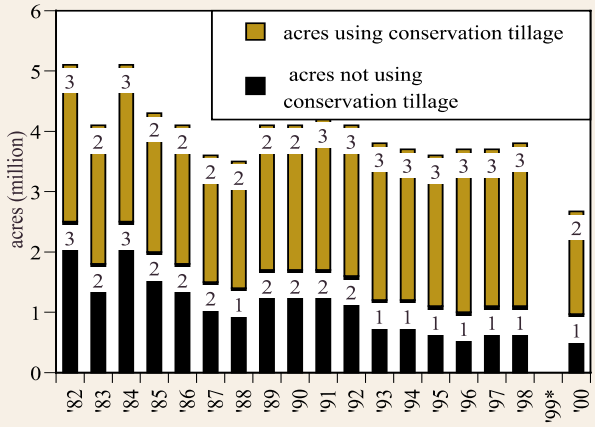
Erosion of topsoil can greatly affect farmland productivity while also degrading the quality of Kentucky's waterways. Siltation is the second leading source of water pollution in Kentucky.[1] Agricultural activities are the leading source of water pollution, contributing 25 percent of the pollution problems found in monitored waterways.[2] During 1997, an estimated that 22.8 million tons of soil eroded from cropland in Kentucky.[3] The U.S. Natural Resources Conservation Service has ranked 2.7 million acres of Kentucky's farmland as highly erodible. The agency estimates that half of the state's crop and pastureland is in need of erosion control measures.[4]

Goal To conserve, protect and encourage development and improvement of the state's agricultural lands for the production of food and other agricultural products.

Measure 1. Farmland Soil Erosion Rates in Kentucky



Measure 2. Conservation Tillage Use in Kentucky



Progress The amount of agricultural land requiring conservation treatment declined by 13 percent from 1982 to 1992, in part because of land retirement, but also because of the use of soil-conserving crop management practices such as conservation tillage.[5] The use of conservation tillage in Kentucky, a farming technique that disturbs less soil, has resulted in a dramatic reduction of soil loss. Erosion rates on cropland have declined from an average of 8.4 tons per acre per year in 1987, to 4.4 tons per acre per year in 1997. Pastureland erosion rates have dropped from 3.0 tons per acre per year in 1987 to 2.0 tons in 1999. It is estimated that 64 percent of Kentucky's farmland utilizes conservation tillage practices.

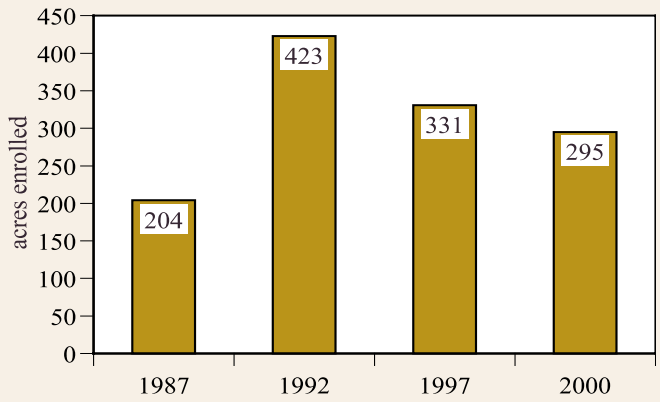
In 1985, Congress created the Conservation Reserve Program (CRP) to help farm owners and operators conserve and improve soil, water, air and wildlife resources by converting highly erodible and other environmentally sensitive land to a long-term (10 to 15 years) resource-conserving cover. In exchange, the federal government makes annual rental payments to the landowner and shares the cost of installing approved conservation practices. Nationwide, some 33.5 million acres are enrolled in the CRP.[6] Participation in the CRP has declined in Kentucky over the past decade, from a high of 423,000 acres in 1992 to 295,000 acres in 2000. This decline is due to the expiration of enrollment contracts of several farmers and expanded use of conservation tillage systems, which has allowed for greater farming of erodable lands with minimal disturbance of soils.[7]

The Kentucky Soil Erosion and Water Quality Cost Share Program was established by the General Assem-

bly in 1994. The program provides technical and financial assistance to individuals to implement Best Management Practices (BMPs) on farms or in woodland operations to improve water quality. The fund grew to more than $11 million in 2000. The program has funded 2,659 agricultural cost share practices to date. The program remains very popular, as indicated by the fact that the state has only been able to fund 37 percent of the 7,181 applicant requests.[8]

Efforts to control pollution from agricultural operations continue. The Kentucky Agriculture Water Quality Act, passed in 1994, requires all farms that are more than 10 acres in size and that meet the definition of an agricultural operation to develop and implement water quality plans to protect water quality and prevent pollution. To date, 32,592 agriculture operations (36 percent of the state's 91,000 farms) have voluntarily filed plans with state conservation districts.

Measure 3. Conservation Reserve Program in Kentucky



Footnotes

1. 305b Report to Congress 1998 and 2000, Ky. Division of Water.
2. Ibid.
3. Based on 5.2 million acres of cropland with an average erosion rate of 4.4 tons/acre/year. Source: 1997 National Resources Inventory.
4. 1997 National Resources Inventory, U.S. Natural Resources Conservation Service, 2000.
5. The U.S. Natural Resources Conservation Service did not conduct a conservation treatment inventory in 1997. The next inventory is scheduled in 2002.
6. Conservation Reserve Program (CRP) Signup, U.S. Department of Agriculture, Farm Service Agency.
7. Ky. Division of Conservation, May 2001.
8. Ibid.

Measures - notes and sources

***Measure 1**. Source: National Resource Inventories, 1982-97, Natural Resources Conservation Service.*
***Measure 2**. *No survey conducted in 1999. Source: Natural Resources Conservation Service.*
***Measure 3**. Source: National Resource Inventories, Natural Resources Conservation Service, 1982-97.*

Concentrated Animal Feeding Operations

Indicator 5. Concentrated Animal Feeding Operations (CAFOs)

At a Glance

Broiler production in Kentucky
1990. 1,520,000
1995. 64,500,000
1999. 188,000,000

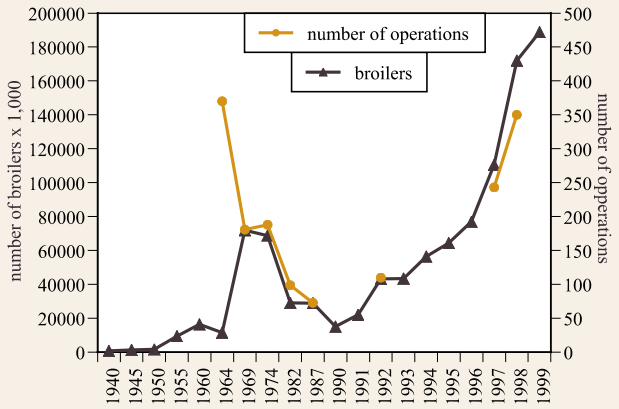
Number of concentrated animal feeding operations
U.S. 12,660
Kentucky. 250

Background The trend toward "corporate farming," the raising of animals owned by large corporations on a contract basis with farmers, has emerged as a major economic, social and environmental issue in Kentucky. Kentucky has witnessed a significant increase in the number of concentrated animal feeding operations (CAFOs) within the past few years.[1] The increase in the number of CAFOs is primarily due to the siting of poultry houses brought on by demand from three chicken processing plants that located in Kentucky during the past several years. Broiler production has increased from 22 million in 1992 to 188 million in 1999.[2] Many farmers are contracting with corporations to raise poultry and other livestock in large concentrated feeding operations.

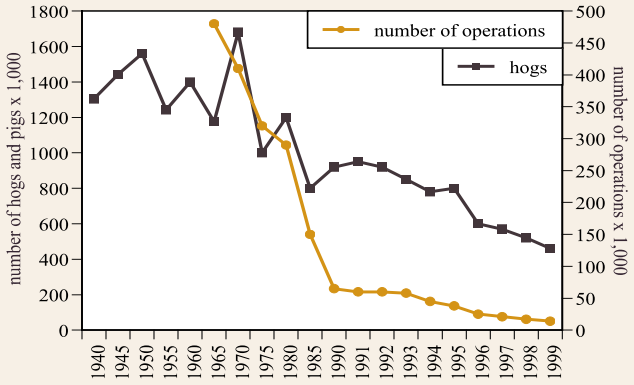
The environmental, health and quality-of-life impacts of concentrated animal feeding operations have become a growing concern in the state. CAFOs can produce large quantities of waste, which has the potential to pollute ground and surface water if not properly managed. For example, a CAFO with 2,500 hogs may produce 1.25 million gallons of waste a year. An operation with 100,000 head of laying hens or broilers can produce 600 tons of litter per year. The waste can create odor problems and contaminate land and water resources.

The U.S. Department of Agriculture estimates that there are 12,660 CAFOs in the United States.[3] There are estimated 250 CAFOs in Kentucky, 90 percent of which are in the western region of the state. McLean County has the largest number of CAFOs in Kentucky, with 36. Eighty six percent of McLean County's CAFOs are poultry operations.[4]

Measure 1. Broiler Production and Number of Farms Producing Broilers in Kentucky



Measure 2. Swine Production and Number of Farms Producing Swine in Kentucky



Goal Protect public health and welfare from the environmental and health threats posed by animal confinement facilities and land application of manure.

Progress State efforts to address environmental and other issues associated with CAFOs have been ongoing for the past four years. The Kentucky Natural Resources and Environmental Protection Cabinet filed its first CAFO regulations in 1997. Those regulations focused on swine operations. The regulations expired in April 2000.

The agency issued another set of emergency regulations in Feb. 2000. The regulations were expanded to address poultry, swine and cattle CAFOs and established CAFO permit conditions for water pollution discharge permits as specified in the U.S. Department of Agriculture and the U.S. Environmental Protection Agency's joint "Unified National Strategy for Animal Feeding Operations" directive issued on March 9, 1999. The regulation also included siting standards for the construction of any new CAFO facilities and provisions that hold both the producer and integrator responsible in the management of animal waste. The regulations were estimated to

affect less than 250 operations in the state (including 176 poultry operations and 64 swine operations). The Kentucky Farm Bureau challenged the regulations alleging the state overstepped its statutory authority. The regulations sunsetted (expired) in April 2001.

Another set of emergency CAFO regulations went into effect on March 23, 2001. These regulations also specify water permits, siting requirements and integrator liability provisions. The constitutionality of the regulation was challenged by several farm organizations. On May 25, 2001 the Franklin Circuit Court declared the regulation void because it was similar to a regulation that had previously expired due to a legislative subcommittee veto. The state has since challenged the legality of the legislative veto process and has asked the court to allow the CAFO regulation to remain in effect until a decision is rendered.

Several counties in Kentucky have also enacted ordinances to protect private property from the impacts of CAFOs including Allen and Cumberland counties, and the city of Marion in Crittenden County.

Efforts are also underway to help farmers better manage animal feeding operations. Funding has been provided to Animal Feeding Operations (AFOs) under the Kentucky Soil Erosion and Water Quality Fund. To date, the program has funded 2,659 agricultural cost-share practices. During 2000, 544 of the 877 practices funded were for animal waste structures. These AFOs were provided $9.3 million of the $10.7 million in cost-share funds allocated in 2000. In addition to these cost-share funds, a portion of the $180 million in state monies ($18 million) received from the master tobacco settlement agreement will be used to help farmers address environmental issues associated with agricultural operations.

Footnotes

1. Under state regulations, a CAFO is defined as a farm with at least 1,000 beef cattle, 700 dairy cattle, 100,000 laying hens or broilers, or 2,500 swine weighing 55 lbs. or more, or a facility that houses 300 animal units and discharges to the waters of the Commonwealth.

2. Kentucky Agricultural Statistics, 1999-2000, page 70.

3. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, Page 60, U.S. EPA., December 15, 2000.

4. Kentucky Division of Water.

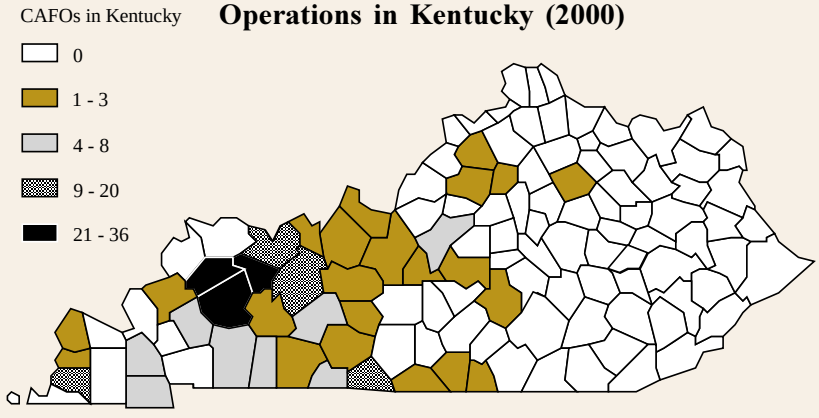
Measures - notes and sources

Measure 1. *Data incomplete, number of poultry operations was not collected on a regular basis. Definition of the number of farms changed in 1975 to a place that sells or could sell $1,000 of agricultural products during the year. Source: Ky. Agriculture Statistics.*

Measure 2. *Definition of the number of farms changed in 1975 to a place that sells or could sell $1,000 of agricultural products during the year. Source: Ky. Agriculture Statistics.*

Measure 3. *Source: Ky. Division of Water.*

Measure 3. Concentrated Animal Feeding Operations in Kentucky (2000)



Forest Resources

Indicator 6. Forest Resources and Utilization

At a Glance

Percent of land covered by forests . . . 46-48%

Percent of growing timber considered large enough for lumber .58%

Board feet of timber harvested in Kentucky
1974. . .342 mill. bd. ft.
1997 . .1.1 billion bd. ft.

Cords of pulpwood harvested in Kentucky
1974. 133,100
1997. 223,000

Lumber production in Kentucky (million board feet)
1960 310
1988 811
1999 900

Number of logging operations inspected
. 1,760

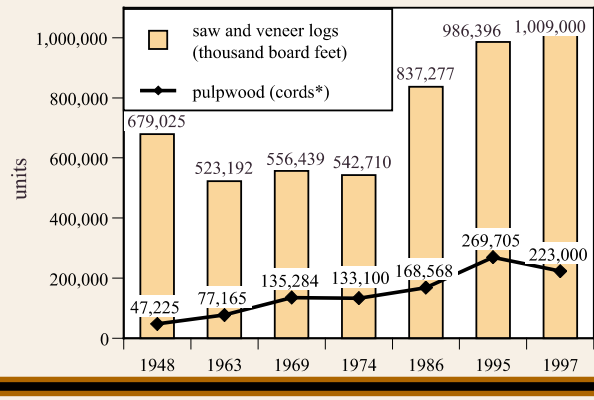
Number of enforcement actions at logging operations 203

Background Forestland covers an estimated 46 to 48 percent (11.9 to 12.7 million acres) of the state's 25.6 million acres of land.[1] The U.S. Forest Service periodically monitors the condition and availability of timber resources in Kentucky. U.S Forest Service inventories in Kentucky have been conducted in 1949, 1963, 1975, and 1987. The 2000-01 forest inventory for Kentucky is currently underway.

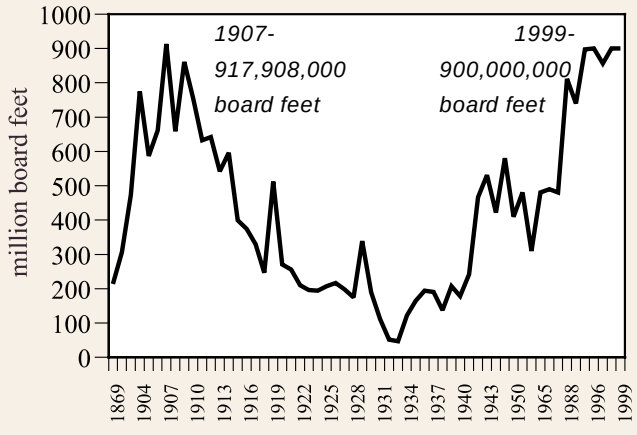
During 1987, (the most recent data available), 58 percent of timber in Kentucky was considered sawtimber (nine inches in diameter for softwood and 11 inches in diameter for hardwood) large enough to be utilized for lumber. Kentucky's forests are being cut at record-high levels due to this timber availability and worldwide demand. During 1997 (the most recent year data available), harvesting of saw and veneer logs (based on surveys of wood-using plants) in Kentucky was estimated at 1.1 billion board feet.[2] Pulpwood production reached record levels in 1995.[3] Lumber production in Kentucky was near record levels during 1999 at 900 million board feet. Another indicator of growing demand for wood products is the price paid for timber. Demand continues to drive up stumpage prices. For example, mixed hardwood stumpage prices rose by almost 27 percent in just one year (1998-1999).[4]

Goal Promote the sustainability of Kentucky's forest ecosystems.

Measure 1. Forest Harvesting Trends in Kentucky



Measure 2. Lumber Production Trends in Kentucky



Progress In response to increased logging of forests, the General Assembly passed the 1998 Kentucky Forest Conservation Act.

The Forest Conservation Act provides loggers with four opportunities to correct erosion and other environmental problems associated with timber harvesting operations. Between July 15, 2000 and Feb. 15, 2001, the Kentucky Division of Forestry had inspected more than 1,760 logging operations and had taken 203 enforcement actions (159 written warnings, 23 informal conferences, four notices of violations, three special orders, and 14 emergency orders). The act also provides for a "bad actor" designation and civil penalties if loggers and operators fail to comply. No loggers have been given bad actor status.

The act requires master loggers at all timber operations. Between 1992 and 2000, a total of 3,663 loggers have graduated from the state master logger program. The program was established in 1992 to train loggers about practices to prevent erosion, proper harvesting practices, safety and other issues.

Footnotes

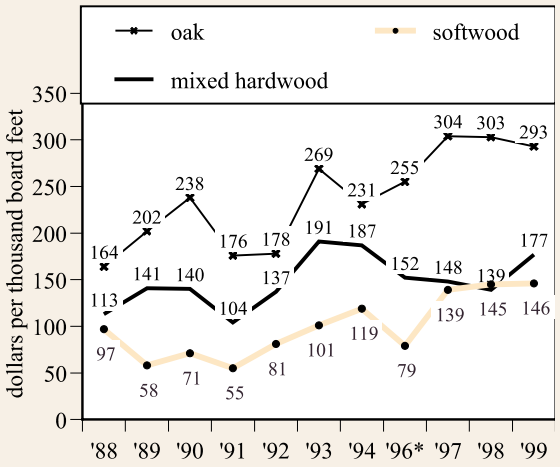
1. The U.S. Forest Service Survey of 1987 indicated 48% (12.7 million acres of Kentucky's land base is covered by private and public forests while the U.S. Natural Resources Conservation Service 1997 Natural Resources Inventory found 46% (111.9 million acres) are in private and public forestlands.

2. Based on saw and veneer logs. "Kentucky's Timber Industry—An Assessment of Timber Product Output and Use," 1997, Daniel Stratton and Larry Lowe, Southern Research Station, SRS 40, Table 10, July 1999.

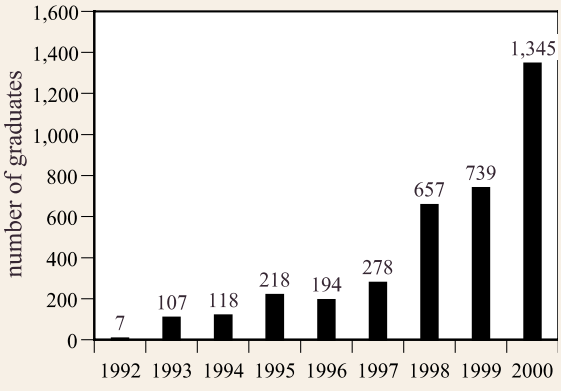
3. Ibid.

4. Statewide delivered log prices are now available on the Ky. Department of Agriculture Web site - http://www.kyagr.com (see wood promotion program).

Measure 3. Average Sawtimber Stumpage Prices for Private Woodlands in Kentucky



Measure 4. Kentucky Master Loggers



Measures - notes and sources

***Measure 1**. Note: Earlier data not available. Based on data collected from the timber product output surveys. The surveys canvass all primary wood-using plants in Kentucky and other states to determine the level of harvests from Kentucky forests.*
Source: U.S. Forest Service.

***Measure 2**. Note: This chart represents lumber produced by mills in Kentucky. This also includes lumber produced from logs (roundwood) brought in from other states, as well as logs (roundwood) harvested in Kentucky. Source: Ky. Division of Forestry, U.S. Forest Service.*

***Measure 3**. Note: Adjusted for inflation using consumer price index for 2000. *1994-1996 data based on estimates. 1995 data not available. Source: Timber Mart-South; Stumpage Price Mart; University of Ky., Department of Forestry; Ky. Division of Forestry.*

***Measure 4**. Source: Ky. Division of Forestry.*

Public Forestland

Indicator 7. Public Forestland

At a Glance

Percent of Kentucky land base covered by public forests 2%

Largest track of public forestland in Kentucky
DBNF . . 695,000 acres

Timber harvests on public forestland
■DBNF
1989 . . 45.1 mill. bd. ft.
1999. . . 1.5 mill. bd. ft.
■LBL
1989 . . . 7.1 mill bd. ft.
1999. . . . . .0 bd. ft.
■State forests
1989. . 1.19 thou. bd. ft.
1999. . . . . 0 bd. ft

Background Public forestlands make up about 896,622 acres or 2 percent of Kentucky's land base, according to 1988 U.S. Forest Service data. These public forests support a wealth of biological diversity and contribute significantly to the state's $8.8 million tourism industry.[1]

The Daniel Boone National Forest (DBNF) is the largest block of publicly owned lands in Kentucky. The DBNF covers over 695,000 acres within 21 eastern Kentucky counties. The Land Between the Lakes National Recreation Area (LBL) encompasses 170,000 acres in western Kentucky and Tennessee. Other public forests include the Mammoth Cave National Park, five state forests,[2] 40 state nature preserves and 33 state wildlife management areas. Some of these public lands are open to timber harvesting including the DBNF, state forests and the LBL.

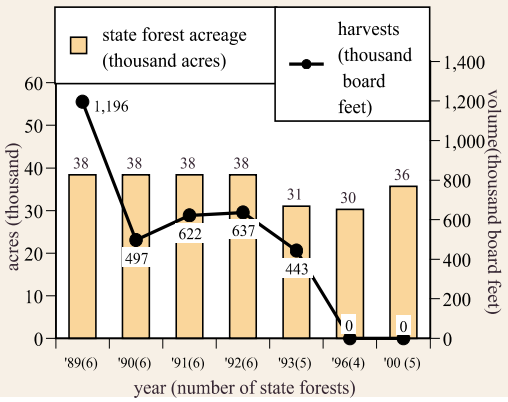
Goal Promote the sustainability of Kentucky's forest ecosystems.

Progress

State Forests. Kentucky's five state-owned forests support recreation, hunting, fishing and camping uses. Timber harvests on state forests were suspended in 1996 to conduct inventories of the forests. The inventories will provide data necessary to manage the forests as ecosystems. An Ecosystem Management Plan has been drafted for the Pennyrile State Forest. Data collection is now underway to develop the Kentucky Ridge State Forest Plan. The Pennyrile State Forest Plan contains a set of "Guiding Principles for Ecosystem Management on Kentucky State Forests," a history of the forest, a description of the forest and individual watersheds, inventory methods used, and a set of goals and strategies to achieve the plan's objectives.

Daniel Boone National Forest. Each year, an estimated 5 million people visit the Daniel Boone National Forest. In addition, the forest provides habitat to dozens of species of wildlife including 36 federally threatened and endangered species. Efforts are underway by the U.S. Forest Service to revise the Daniel Boone National Forest Land and Resource Management Plan with an emphasis on sustainability, ecosystem health, multiple benefits to people, collaboration and use of the best available science. The plan is expected to be drafted by 2002-2003. Timber harvests also occur on the DBNF. Timber sales reached an all-time high in 1989 at 45.1 million board feet, but since then have dropped 76 percent in 1999 when 1.5 million board feet was harvested from the forest. The decline in timber sales is attributed to a new emphasis on recreation and ecosystem management, as well as lawsuits and appeals challenging timber sales.

Measure 1. Harvesting Trends in State Forests of Kentucky



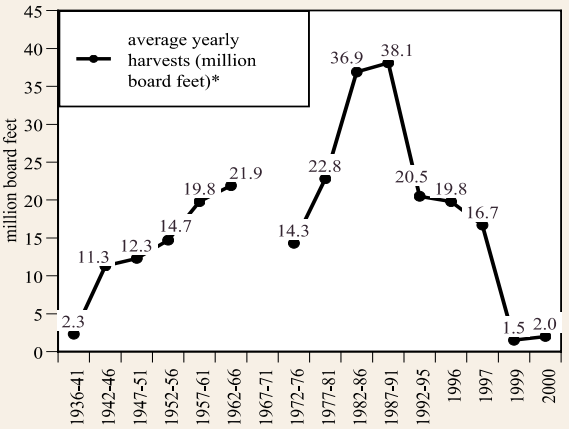
Land Between the Lakes National Recreation Area. In 1994, the Tennessee Valley Authority (TVA) developed the LBL Forest Management Plan, which included forest management practices. In the plan, TVA proposed to sell an average of 5.3 million board feet of timber a year over the next decade. The U.S Forest Service assumed management of the LBL in 1999. At that time all timber sales were suspended. Timber sales will resume in 2001. The U.S. Forest Service plans to prepare its own Land and Resource Management Plan for the LBL in the next few years.

Footnotes

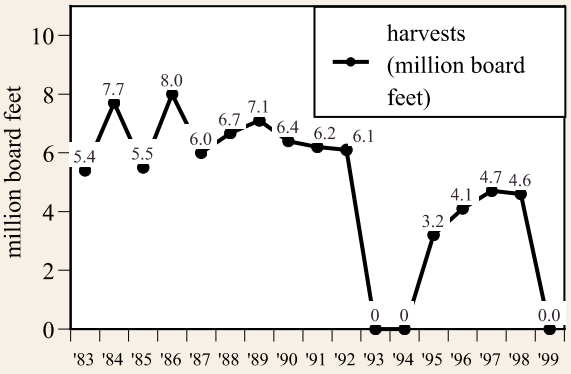
1. *In 2000, travelers to Kentucky spent $8.8 million. This spending generated $777,109,116 in state tax revenues and employed 163,486. Tourism is Kentucky's third largest industry and second largest employer. Source: Ky. Tourism Cabinet.*

2. *Kentucky's 5 state forests are:* ***Pennyrile Forest*** *(14,654 acres in Christian, Hopkins, Caldwell counties) – Four tracts (201 acres) have been added to the forest since 1996. These tracts were purchased for the purpose of consolidating forest through the elimination of in-holdings.* ***Kentucky Ridge Forest*** *(15,251 acres in Bell County) – Two tracts (3,888 acres) were added to the Kentucky Ridge State Forest since 1996 for use as timber management, wildlife management, recreation and education. One tract will also protect a large area of the north face of Pine Mountain.* ***Kentenia Forest*** *(4,227 acres in Harlan County) - Since 1996, two tracts totaling 653 acres have been added to the forest for the purpose of road access and connecting two existing tracts.* ***Tygarts Forest*** *(800 acres in Carter County).* ***Green River State Forest*** *(703 acres in Henderson County) - This is a new 703-acre state forest that was acquired through an interagency deed of conveyance with the Economic Development Cabinet and the Finance Cabinet on July 20, 1998. It is a bottomland hardwood ecosystem.*

Measure 2. Logging Trends in the Daniel Boone National Forest



Measure 3. Logging Trends in Land Between the Lakes National Recreation Area



Measures - notes and sources

Measure 1*. Source: Ky. Division of Forestry.*

Measure 2*. *Based on 4-year averages 1936-1995. 1936-61 are actual average harvest volumes for those years depicted, 1976-93 data represents averages for volume sold under contract which may not necessarily be what was harvested that year. Data not available for 1967-71. Source: U.S. Forest Service.*

Measure 3*. Source: Tn. Valley Authority, U.S. Forest Service, Ky. Division of Forestry.*

Forest Management

Indicator 8. Forest Stewardship and Management on Private Woodlands

At a Glance

Number of forestland owners in Kentucky. 306,900

Acres of private forestland in Kentucky. . . . . 11.4 million

Percent of forestland owned by private landowners 93%

Average woodland tract . . . . . 30.4 acres

Percent of private forestland with forest plans 16%

Background Many experts agree that managing Kentucky's forests in a sustainable manner and building a diverse forest industry will require a strong program of landowner assistance and education.

There are more than 306,900 private forestland owners in Kentucky. These landowners own about 93 percent of the 12.7 million acres of forestland in the state.[1] The average woodland tract is 30.4 acres. Currently, the state employs 40 field foresters—that amounts to 7,673 landowners for every state forester.

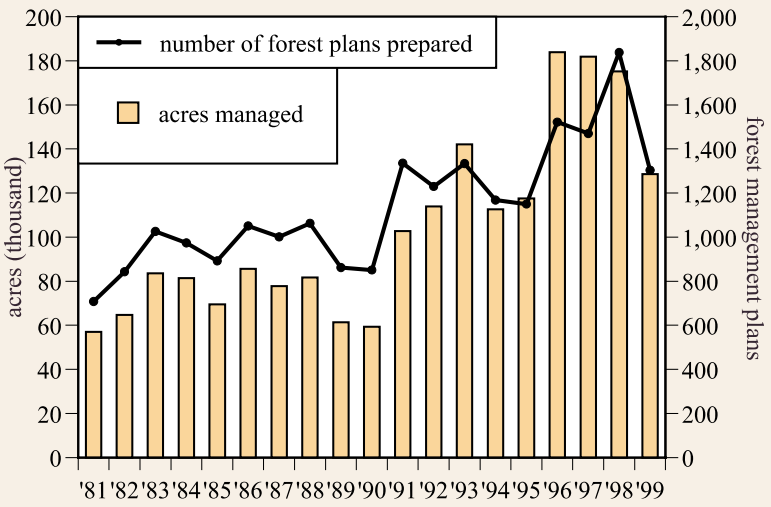
Goal Promote the sustainability of Kentucky's forest ecosystems.

Progress It is difficult to determine the level of forest management in Kentucky given the fact that there are so many landowners and acres of private forestland in the state. However, one indicator which can be used to track forest stewardship and management is the number of forest plans prepared by the Kentucky Division of Forestry. The preparation of forest plans is one of the most requested services by landowners. Between 1981 and 1999, the Kentucky Division of Forestry and its cooperators worked with landowners to prepare 21,623 forest plans covering 1.94 million acres of forestland. This represents 16 percent of the 11.4 million acres of private forestland in the state.

Other services requested by landowners through the state's Forest Stewardship Program include tree planting, timber marking and improving a forest stand. However, the reduction in federal funding of the Forest Stewardship Incentive Program, which finances up to 50 percent of landowner costs to manage their forestland, has impaired the state's ability to promote these types of practices. This federal program was not funded in 1999 or 2000. Kentucky continues to operate the cost-share program with money recovered from defaulted cost-share practices. Speculation is that there may be a new forestry cost-share program proposed in the national 2002 Farm Bill. The Kentucky Forest Conservation Act, passed in 1998, included a state Forest Stewardship Incentives Fund to assist in funding a cost-share program for landowners. However, funding has not yet been provided by the General Assembly to implement the program.

Most landowners requesting assistance from the Division of Forestry cite good forest

Measure 1. Forest Plans Prepared for Private Woodlands in Kentucky



management as their top priority (75 percent), followed by wildlife management (23 percent). The Kentucky Division of Forestry is now in the process of developing a plan to improve its outreach efforts to educate landowners about forest management practices and programs. The Kentucky Division of Forestry has contracted with a marketing firm to conduct a survey of forest landowners to determine their attitudes and motivations about forest stewardship. An outreach plan will be developed based on the survey findings.

Footnotes

***1**. Forestland as estimated by the U.S. Forest Service in Private Forestland Owners of the U.S., 1994.*

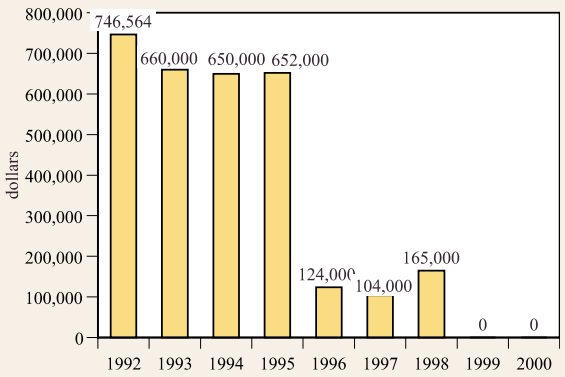
Measures - notes and sources

***Measure 1**. Includes Forest Management Plans and Forest Stewardship Plans prepared by the Ky. Division of Forestry, Ky. Forestry Industry and Ky. Association of Consulting Foresters (KACF). Data not available from KACF for the years 1994-1997. Source: Ky. Division of Forestry.*

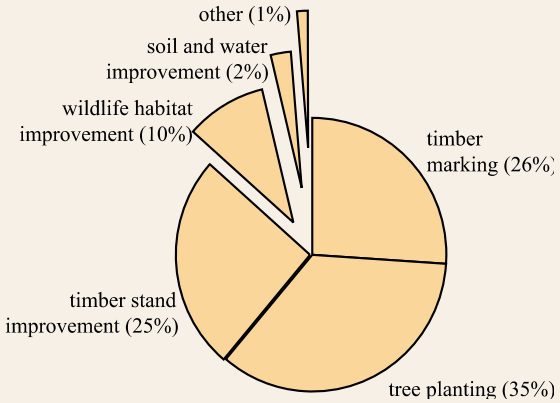
***Measure 2**. Source: Ky. Division of Forestry.*

***Measure 3**. Based on 453 landowner requests for assistance to the Ky. Division of Forestry in 2000. Other includes site preparation for natural regeneration and riparian area improvement. Source: Ky. Division of Forestry.*

Measure 2. Funding of Federal Forest Stewardship Incentive Programs in Kentucky



Measure 3. Forest Practice Requests in Kentucky



Forest Industry

Indicator 9. Forest Industry

At a Glance

Kentuckians employed by the wood industry 38,000

Direct value of wood industry in Kentucky. . . . . $5.17 billion

Number of primary wood producers
1994 615
1999. 510

Number of secondary wood producers
1994. 449
1999. 514

Background The state's forest industry is composed of primary producers, such as sawmills, and secondary manufacturers which make a product such as furniture, from wood materials. In 1999, 510 primary and 514 secondary wood companies were operating in the state.

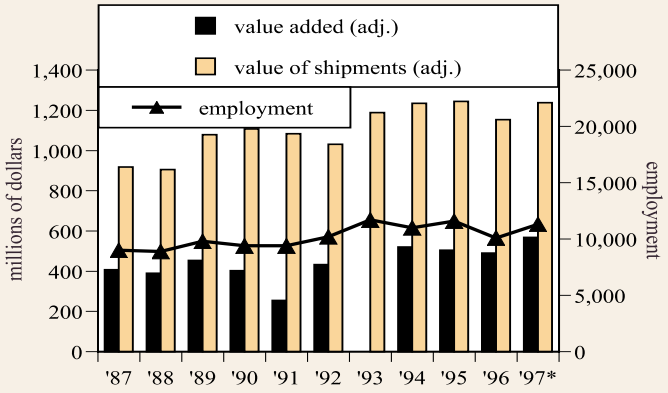
According to the 1997 census, the most recent year data is available, the lumber and wood industry employed 11,319 people with a value of shipments at $1.2 billion.[1] However, an assessment conducted by the Kentucky Cabinet for Economic Development places the direct value of the Kentucky wood industry at $5.17 billion and employment levels at 38,000.[2]

Goal Promote the most efficient utilization of Kentucky's forest resources.

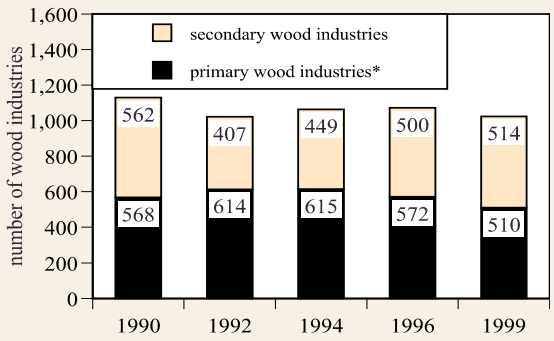
Progress Kentucky continues to see a decline in the number of primary wood producers in the state. Since 1994, the number of primary wood industries has declined 17 percent; from 615 to 510 primary producers. The decline is attributed to a consolidation of production by larger producers. According to state forestry officials, some of the lumber mills are increasing capacity and/or acquiring smaller mills.

Efforts are also underway to strengthen the state's secondary forest industry. While Kentucky is the third leading hardwood-producing state in the country, it accounts for only one percent of the nation's secondary wood industry employment. Recognizing the potential of the secondary wood industry to add jobs and diversify local economies, the state created the Kentucky Wood Products Competitiveness Corporation. The corporation was established in 1994 to enhance the secondary wood products industry and promote "Kentucky made" wood products. Since then, 65 new secondary wood industries have located in Kentucky, a 14 percent increase in a 5-year period.

Measure 1. Kentucky Lumber and Wood Industry Economic Trends



Measure 2. Wood Industry in Kentucky



Footnotes

1. Industry Statistics for the State: 1997, U.S. Census Bureau, 1997 Economic Census, May 8, 2000.

2. Based on sales from primary, secondary, and pulp/paper. 2000 National IMPLAN Conference, Kentucky's Secondary Wood Products Industry, Phil Flynn, Staff Economist, Division of Research, Ky. Cabinet for Economic Development, October 12-13, 2000.

Measures - notes and sources

***Measure 1**. Note: Adjusted for inflation using the consumer price index for 2000. 1993 value added data not available. *Data for 1997 from the U.S. Census Bureau, 1997 Economic Census. Source: U.S. Census Annual Survey of Manufacturers, U.S. Census 1997 Economic Census.*

***Measure 2**. *Includes pallet manufacturers. Source: Ky. Division of Forestry.*

Indicator 10. Forest Fires

Background Wildfires are one of the greatest threats to Kentucky's forests. For the past 10 years, Kentucky has averaged 1,447 wildfires that burned 44,801 acres annually. The intensity of wildfires is primarily the result of dry and windy weather conditions. In 1999, private forestland acreage burned was the fourth highest on record, due to drought conditions experienced that year. While wildfires occur in every county, the heavily forested eastern region leads the state with most burned acreage, with Pike County leading the state.

Arson was responsible for more than half of the wildfires occurring on private woodlands during the past 10 years. This cause was followed by debris burning at 28 percent and carelessness from smoking at 3 percent.

Goal Improve, maintain and protect the health and condition of Kentucky's forest resources.

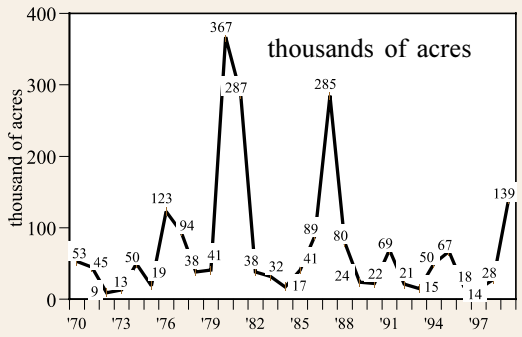
Progress The state provides for wildland fire detection, suppression and law enforcement. Counties are assessed two cents per woodland acre with funds going to the Kentucky Division of Forestry ($228,000 was collected in 2000). The money is apportioned back to counties to help with fire suppression. The state also has partnerships with the National Guard, Department of Corrections, Southern Forest Fire Compact and the U.S. Forest Service to supplement Kentucky Division of Forestry wildfire suppression resources.

In the past few years, the state has made the prosecution of arsonists a top priority. However, it is often difficult to catch arsonists in the act. For example in 1999, 1,349 forest wildfires burning 111,452 acres in Kentucky were attributed to arson. However, only four felony arson citations were issued; three of those resulted in convictions.

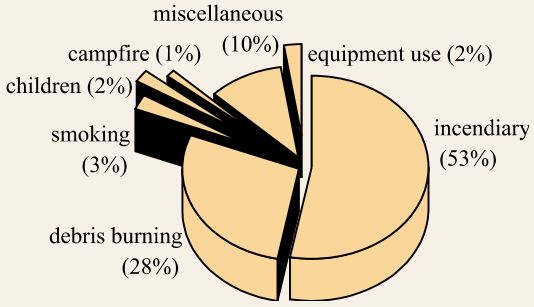
U.S. Forest Service officials report that arsonists contribute to the majority of wildfires on the Daniel Boone National Forest as well. Extreme drought conditions intensified fire behavior activity during 1999 and 2000, burning more than 25,000 acres.

Prescribed fire is a tool used by trained individuals to manage vegetation to create and maintain specific forest conditions. For the past several years, prescribed fires have been used on the Daniel Boone National Forest to improve habitat conditions for species, such as the endangered red-cockaded woodpecker, dependent on the southern pine ecosystem. The U.S. Forest Service reports that each burn is conducted by qualified individuals only after ensuring that site conditions such as wind speed, temperature, and relative humidity are within the allowable range.

Measure 1. Forest Wildfires on Private Woodlands in Kentucky



Measure 2. Wildfire Causes on Private Woodlands in Kentucky (1991-2000)



At a Glance

Average number of wildfires per year 1,447

Average acres of forestland burned per year 44,801

Leading causes of wildfire in Kentucky
arson. 53%
debris burning . . 28%

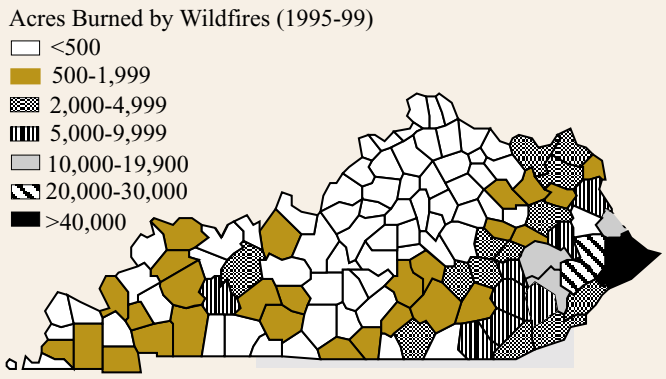
Number of forest fires attributed to arson (1999) 1,349

Number of arson violations issued (1999) 4

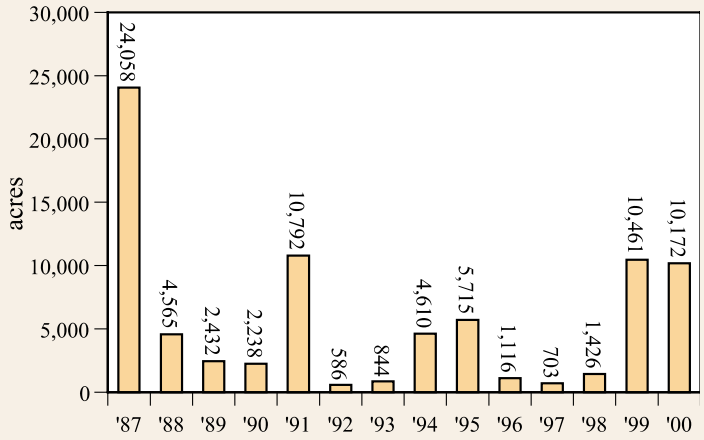
Number of arson convictions (1999) . . 3

Forest Fires

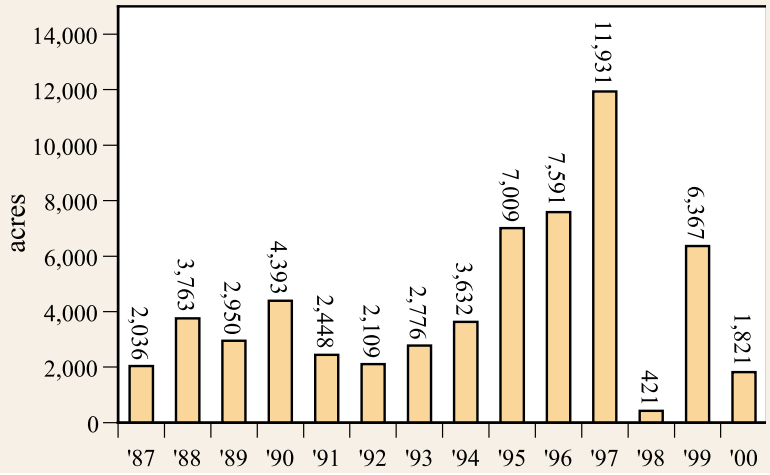
Measure 3. Private Woodlands Burned in Kentucky (1995-99)



Measure 4. Wildfire in the Daniel Boone National Forest



Measure 5. Prescribed Fires in the Daniel Boone National Forest



Measures - notes and sources

***Measure 1**. Excludes federal forestland. Source: Ky. Division of Forestry.*

***Measure 2**. Chart based on 10 year fire totals (1991-2000). Excludes federal forestland. Miscellaneous includes lightning, railroad and other causes. Source: Ky. Division of Forestry*

***Measure 3.** Excludes federal forestland. Source: Ky. Division of Forestry.*

***Measure 4.** Earlier data not available. Source: U.S. Forest Service.*

***Measure 5**. Earlier data not available. Source: U.S. Forest Service.*

Indicator 11. Forest Health

Background There are many factors that affect forest health, including air pollution, wildfires, poor logging practices and numerous pests and diseases. Nonnative invasive species are a particular problem in Kentucky's forests. The chestnut blight fungus, introduced in the United States in the 1940s, all but wiped out this commercially valuable tree species in Kentucky and nationwide. Dutch Elm disease eliminated more than half the elm trees in the country. Dogwood anthracnose, Hemlock woolly adelgid and Butternut canker are diseases also threatening the diversity and health of Kentucky's forests.

In recent years, the gypsy moth, *Lymantria dispar Linnaeus*, has become an increasing threat to forest health in Kentucky. The gypsy moth is one of the most notorious pests of hardwood trees in the Eastern United States. Gypsy moths are spreading at a faster rate than in the past and could infest much of the South and Midwest during the next 30 years. The gypsy moth has been observed primarily in northeastern and eastern Kentucky.

Kentucky is also facing its most severe outbreak of southern pine beetles. The southern pine beetle has long been considered the most destructive insect pest of pine throughout the South. Aerial reconnaissance of the Daniel Boone National Forest indicate that 60 to 80 percent of the pine ecosystem has been impacted by the beetle, resulting in thousands of acres of dead pine trees. Aerial surveys by the Kentucky Division of Forestry revealed an additional 311 infested areas in seven eastern Kentucky counties. Environmental conditions such as drought and mature pine stands have likely contributed to the southern pine beetle epidemic currently occurring in the state.[1]

At a Glance

Threats to Kentucky's forests
- wildfires
- gypsy moth
- southern pine beetle
- dogwood anthracnose
- butternut canker
- hemlock woolly adelgid

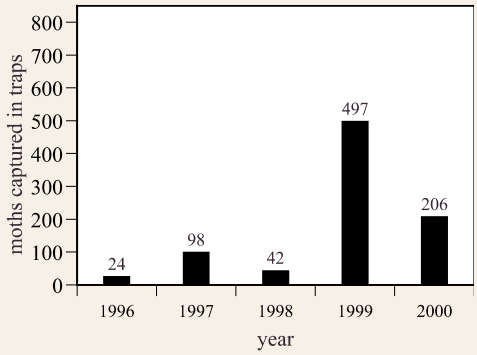
Damage by southern pine beetle
2000. . . 60 to 80% of pine ecosystem impacted

Goal Improve, maintain, and protect the health and condition of Kentucky's forest resources.

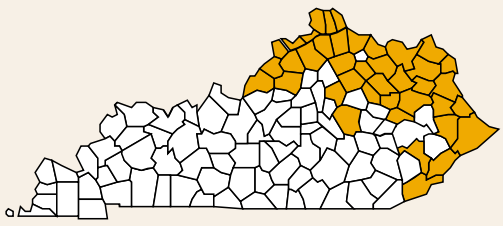
Progress Since 1996, the Kentucky Division of Forestry has conducted gypsy moth surveys in the Commonwealth. The surveys reveal varying population densities of the gypsy moth on state and private forestlands throughout northeast and eastern Kentucky. Currently, populations are at a level where no major forest impacts have been observed.

The 2000 gypsy moth trapping season ended in late August. A total of 1,518 traps were set and 206 gypsy moths were captured. The U.S. Forest Service has also conducted its own gypsy moth trapping surveys on the Daniel Boone National Forest. In 1999, seven moths were captured in Rowan, Bath and Powell counties. One moth was captured in Laurel County in 2000. In 1992, the U.S. Forest Service began a pilot program to test the feasibility of "slowing the spread" (STS) of the gypsy moth. STS pilot programs currently exist in Kentucky, North Carolina, Virginia, West Virginia, and Michi-

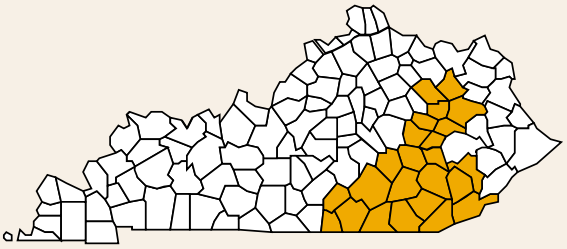
Measure 1. Gypsy Moth Captures in Kentucky



Measure 2. Location of Gypsy Moth Captures in Kentucky



Measure 3. Southern Pine Beetle Activity in Kentucky



gan. The STS project in Kentucky includes Boyd, Bracken, Carter, Greenup, Lewis, Mason, Pendleton and Robertson counties.

The Kentucky Division of Forestry has received federal funds to assist with suppression activities for the southern pine beetle. These activities include continuing aerial detection surveys; initiating ground surveys; identifying and notifying landowners; and providing suppression information to landowners.

Footnotes

***1**. Evaluation of Southern Pine Beetle Outbreak on State and Private Lands in Kentucky, Sara L. Sanders, Ky. Division of Forestry, August 2000.*

Measures - notes and sources

***Measure 1**. Source: Ky. Division of Forestry.*
***Measure 2**. Based on gypsy moth surveys and captures. Source: Ky. Division of Forestry, U.S. Forest Service.*
***Measure 3**. Based on aerial and ground surveys. Source: Ky. Division of Forestry.*

Indicator 12. Tree Planting and Reforestation

Background Interest in tree planting and reforestation is growing in Kentucky. For example, the state has initiated a reforestation project for mined lands. And many communities are working to reforest areas. Reforest the Bluegrass is a partnership of the Lexington/Fayette Urban County Government, the community and sponsors. Reforest the Bluegrass is working to create large urban forests. During 1999 and 2000 more than 1,800 volunteers planted 58,000 tree seedlings on city park property.

It is not known exactly how many trees are planted each year or acres are reforested in Kentucky since data are not available to make an exact determination. The majority of Kentucky's forests are hardwood which can regenerate naturally. Landowners can also implement various regeneration practices to perpetuate their forests. A survey conducted by the Kentucky Forest Industry Association reveals that in 2000, 278,098 acres of private forestland was regenerated naturally and 6,152 acres were replanted.[1] That year the forest industry reforested 2,284 acres naturally and planted 2,284 acres.[2] The single largest source of tree seedlings for reforestation in Kentucky is the Division of Forestry's tree nurseries.[3]

Goal Promote the sustainability of Kentucky's forest ecosystems.

Progress In recent years, the number of seedlings sold from the Kentucky Division of Forestry's two nurseries has averaged 4.4 million per year. Long-term trends reveal, however, that the number of seedlings sold has fallen, likely the result of a decline in surface mining in the state and the use of trees to reclaim mine sites. It is anticipated by state forestry officials that the number of seedlings sold will increase due to local and state reforestation initiatives.

One such initiative currently underway is promoting the reforestation of mine lands. Only a small portion of Kentucky's surface mined areas have been reclaimed to forestland. In an effort to promote forestland as the post mining land use of choice, the Kentucky Department of Surface Mining Reclamation and Enforcement (DSMRE) created a work group to develop a set of guidelines to promote forests on mined lands. The recommendations were incorporated into Reclamation Advisory Memorandum #124 in 1997. Since then, there has been an increase of approximately 15 percent in the number of surface mining applications that propose reforestation as the post mining land use.

The DSMRE was been working closely with the University of Kentucky on the development and construction of approximately 100 acres of reforestation test plots. The ongoing field trails indicate that surface-mined lands are very capable of supporting high-value forests if properly reclaimed. The state recently was awarded a $2 million grant from the federal Office of Surface Mining to promote reforestation of thousands of acres of coal mine lands.

At a Glance

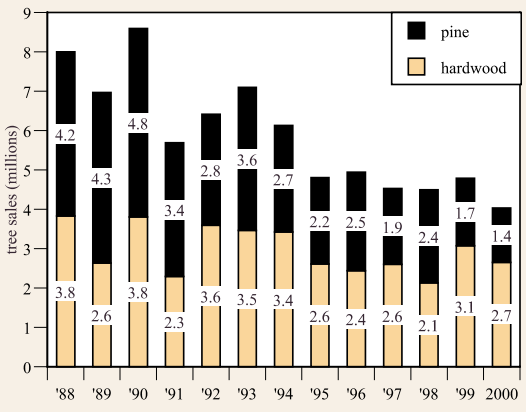
Acres of land requiring reforestation in Kentucky . . unknown

Acres of private forestland regenerated naturally (2000) 278,098

Acres of private forestland replanted (2000) 6,152

Tree seedlings sold from state nurseries . .4.4 million per year

Measure 1. Tree Planting in Kentucky



Footnotes

1. *"The Sustainable Forestry Initiative Report for Kentucky for the Year 2000," Ky. Forest Products Assn.*

2. *The Kentucky Division of Forestry operates two tree nurseries: John P. Rhody Tree Nursery, Gilbertsville and Morgan County Tree Nursery, West Liberty.*

Measures - notes and sources

Measure 1*. Based on seedlings sold from two Ky. Division of Forestry nurseries by fiscal year (July 1- June 30). Source: Ky. Division of Forestry.*

Urban Forests

Indicator 13. Urban Forests

At a Glance

Kentucky population living in urban settings
1990 1,779,947
2000. 1,915,485

Communities with urban forest programs in Kentucky
1995. 72
1999 126

Kentucky communities designated as a tree city USA
1995. 31
1999. 26

Background While Kentucky is typically thought of as a rural state, an estimated 48 percent of the population now lives in what is considered a metropolitan area.[1] The population of Kentuckians living in or near metropolitan areas rose from 1,779,947 in 1990 to 1,915,485—an increase of 135,538 in a 10 year period. This migration has caused a profound impact on existing natural resources and farmland surrounding urban areas. Interest has become high in providing forest settings such as parks, greenways and other lands to enhance recreational opportunities and improve the quality of life in urban and suburban communities.

Goal Develop and enhance urban forest programs throughout the state.

Progress The number of cities in Kentucky with urban forestry programs has doubled since 1993 and now stands at 126. In addition, 26 Kentucky communities are certified as a Tree City USA, thereby improving the natural environment for more than 31,000 residents. The Division of Forestry reports that its urban forestry program reaches nearly two-thirds of Kentucky's populations. The Division of Forestry provides technical assistance to individuals, service organizations, nonprofit groups, and communities in establishing Tree Boards, drafting tree ordinances, conducting street tree surveys, tree planting and maintenance and addressing insect and disease problems.

Federal Urban and Community Assistance Grants have assisted many Kentucky communities in developing local urban forestry programs. Since 1996, $772,304 in assistance grants has been awarded to 140 urban forestry projects across the state. These grants have funded a variety of projects including a master plan for protecting open spaces and water resources in Elizabethtown, an outdoor environmental education center in Estill County and a number of demonstration planting projects in various communities.

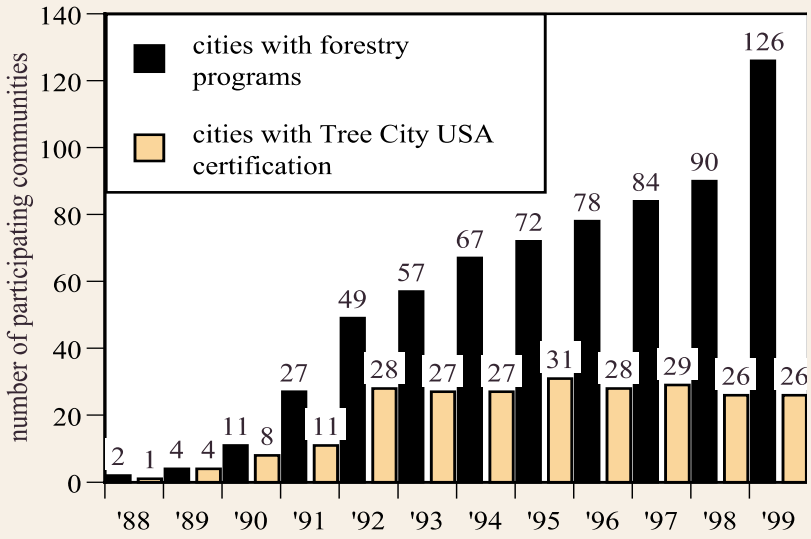
Footnotes

1. *Inside and outside a central city. Source: 1990 and 2000 U.S. Census.*

Measures - notes and sources

Measure 1*. Source: Ky. Division of Forestry*

Measure 1. Urban Forest Programs in Kentucky



Endangered Species

Indicator 14. Threatened, Endangered and Rare Species

Background The diversity of living things, or biological diversity, as it has come to be known, is a fundamental aspect of life on our planet.[1] The concern over biodiversity has heightened in the past 25 years as the world's human population has exceeded 6

One component of biological diversity is the many different kinds of plants, mammals, birds, fish and other organisms that make up our natural world. It has been estimated that there may be up to 204,700 native species in the United States.[2] Thousands of other species, especially insects and microorganisms, have yet to be described and classified.

There are numerous reasons why some of these species have become extinct. Some are naturally rare and were so historically. However, many extinctions have been the result of pollution, habitat alteration and destruction, competition from exotic species and overharvesting. In Kentucky, 45 native species such as the ivory-billed woodpecker, gray wolf, red wolf and eastern cougar no longer exist in the state.[3] Nationwide, more than 1,000 species of wildlife and plants have been listed by the U.S. Fish and Wildlife Service as threatened or endangered.

A number of species, while not listed as federally threatened or endangered, are deemed to be rare in Kentucky. The Natural Heritage Database, the primary source of native species information in the state, currently lists 560 bird, fish, mussel, plant, mammal and amphibian/reptile species that are considered rare or of special concern; that's 18 percent of all those known species in the state.

The Kentucky State Nature Preserves Commission continues to revise the state's listing of rare species. As more information is gathered, additional groups have been added to the list, including mosses, lichens, millipedes and arachnids. The Kentucky Legislature passed the Rare Plant Recognition Act in 1994 to recognize endangered and threatened species of plants. The Nature Preserves Commission is preparing to finalize an official list of rare plants through the regulatory promulgation process.

At a Glance

Kentucky's wild species*. 3,125

Number listed as federally threatened and endangered. 42

Number considered rare 560

Number extinct or extirpated 45

**Does not include insects, arachnids, snails, and crustaceans.*

Goal Identify, protect, manage and recover habitat for animals and plants that are in danger of extinction.

Progress Since the passage of the federal Endangered Species Act in 1973, 5.8 percent of the 18,949 known native species of plants, fish, mussels, amphibians, reptiles, birds and mammals in the United States have been federally-listed as threatened or endangered.[4] Forty-two (1.4 percent) of Kentucky's species have been federally listed as threatened or endangered. Federally-listed threatened and endangered species are known to occur in 101 of the 120 counties of Kentucky.

Kentucky ranks 12th in the nation in the number of federally-listed threatened and endangered species. This ranking is the result of several factors, including the high level of biodiversity found

Measure 1. Top 15 States with Most Threatened and Endangered Species

state	# species	state	# species
1. Hawaii	312	9. Virginia	53
2. California	276	10. Arizona	50
3. Florida	100	11. N. Carolina	48
4. Alabama	99	**12. Kentucky**	**42**
5. Tennessee	88	13. Utah	40
6. Puerto Rico	75	14. New Mexico	38
7. Texas	55	15. Mississippi	32

Measure 2. Species at Risk in the U.S. and Kentucky

	vascular plants	birds	amphibians/ reptiles	mussels	freshwater fish	mammals	total
United States							
total species*	16,108	822	520	305	776	418	18,949
endangered	564	78	24	61	69	63	859
threatened	141	15	30	8	44	9	247
rare***	60	72	72	152	195	30	581
Kentucky							
total species*	2,262	350	103	103	237	70	3,125
federally listed	9	4	0	20	4	4	41*
rare**	372	49	28	36	61	14	560
extinct/extirpated	4	8	1	19	8	5	45

Endangered Species

Measure 3. Federally Threatened/ Endangered Species in Kentucky (2001)

Mammals
Indiana bat
Virginia big-eared bat
Gray bat
Eastern puma

Birds
Bald eagle
Least tern
Red-cockaded woodpecker
Piping plover

Fishes
Blackside dace
Relict darter
Palezone shiner
Pallid sturgeon

Mussels
Clubshell
Fanshell
Cumberland bean
Cumberland elktoe
Cracking pearlymussel
Dromedary pearlymussel
White wartyback pearlymussel
Cumberlandian combshell

Mussels
Littlewing pearlymussel
Pink mucket pearlymussel
Catspaw
Rough pigtoe
Fat pocketbook
Northern riffleshell
Tan riffleshell
Ring pink
Orangefoot pimpleback
Oyster mussel
Winged mapleleaf
Tubercled blossom

Plants
Cumberland rosemary
Cumberland sandwort
Price's potato-bean
Braun's Rock cress
Running buffalo clover
Short's goldenrod
Virginia spiraea
White-haired goldenrod
Eggert's sunflower

Crustacean
Mammoth Cave Shrimp

in the state and the extensive alteration of natural ecosystems that has occurred, such as the clearing of forests and the damming of rivers.

Efforts are underway to restore several species of wildlife and plants in Kentucky. Recent initiatives have focused on the river otter, black bear, elk, peregrine falcon, osprey, White-haired goldenrod, Eggert's sunflower and Braun's rock cress.

Footnotes

1. Kentucky Alive, Report of the Kentucky Biodiversity Task Force, 1995.

2. Precious Heritage: The Status of Biodiversity in the United States, The Nature Conservancy, 2000.

3. Endangered Species Listed in Each State, U.S. Fish and Wildlife Service, Web site - http://ecos.fws.govwebpage/usmap.html, September 1, 2000.

4. General Statistics for Endangered Species, U.S. Fish And Wildlife Service, Web site - http://endangered.fws.gov/stats/genstats.html, May 31, 2000.

Measures - notes and sources

Measure 1. *Threatened and endangered species based on data from the U.S. Fish and Wildlife Service. *Does not include the Mammoth Cave Shrimp (a crustacean) which is also federally-listed as threatened and endangered. Source: Ky. Nature Preserves Commission, U.S. Fish and Wildlife Service.*

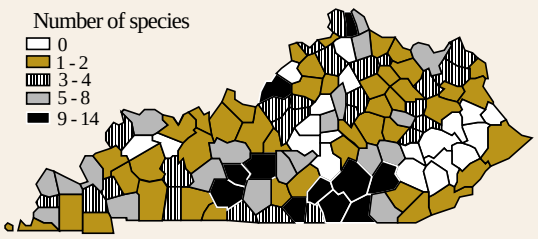
Measure 2. *Does not include insects, arachnids, snails, crustaceans. *Includes native species only. **Species considered threatened and endangered in Kentucky (but not all necessarily rare in other states) as listed by the Ky. Nature Preserves Commission. ***Designated as GX (presumed extinct), GH (possibly extinct), G (critically imperiled) and G2 (imperiled) by the Natural Heritage Central Database. Source: Ky. State Nature Preserves Commission, U.S. Fish and Wildlife Service.*

Measure 3. *Federal listing based on historic range of species. Not all listed species still occur in Kentucky. For example, the eastern puma has been extirpated from the state. Source: U.S. Fish and Wildlife Service.*

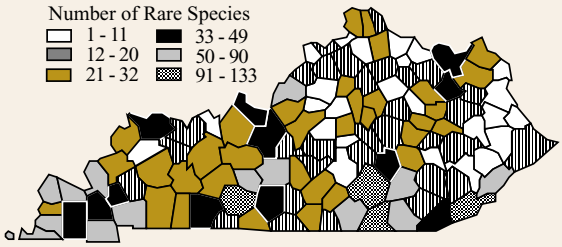
Measure 4. *Source: Ky. State Nature Preserves Commission.*

Measure 5. *Species considered threatened and endangered in Kentucky (but not all necessarily rare in other states) as listed by the Ky. State Nature Preserves Commission. Source: Ky. State Nature Preserves Commission.*

Measure 4. Federally Listed Threatened and Endangered Species in Kentucky



Measure 5. Rare Species in Kentucky



Indicator 15. Fish and Mussels

Background Freshwater mussels are the most at risk group of species in the United States and Kentucky. Some 305 species of freshwater mussels are found in the United States, which boasts the greatest diversity of mussels in the world.[1] But 23 percent of these native mussels are now considered rare. The loss of native fish and mussels is linked to water pollution and ecosystem alterations such as channelization and dams. One-third of Kentucky's monitored waterways are impaired by pollution. In 1997-99, 22 percent of the 8,581 miles of waterways assessed for aquatic life could not fully support or partially support the fishable goal. Another growing threat to native mussels is the exotic zebra mussel which can attach to native species and prevent feeding and reproduction. Zebra mussels have been found in several state waterways including the Kentucky River, the Ohio River, Lake Barkley and Kentucky Lake.

Kentucky has a great diversity of mussels, with 103 native species. Only two states, Alabama and Tennessee, have more species of mussels than Kentucky.[2] Thirty-five percent of the state's native mussel species are considered at risk. Threatened and endangered mussels have been found in 58 Kentucky counties. Several species of freshwater fish are also at risk. Of the 237 fish species native to Kentucky, 26 percent are considered rare. Threatened and endangered fish occur in six counties in Kentucky. Among those is the Blackside dace, which was federally-listed as threatened in 1987. This rare, three-inch-long fish is found only in very short segments of 30 creeks in the Cumberland River Basin in Kentucky and Tennessee.

At a Glance

Number of mussel species in Kentucky 103

Number of mussel species at risk 36

Number of fish species in Kentucky 237

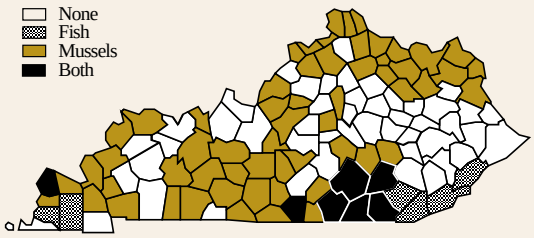
Number of fish species at risk . . . 61

Goal Enhance, restore and protect wildlife diversity and support sustainable use.

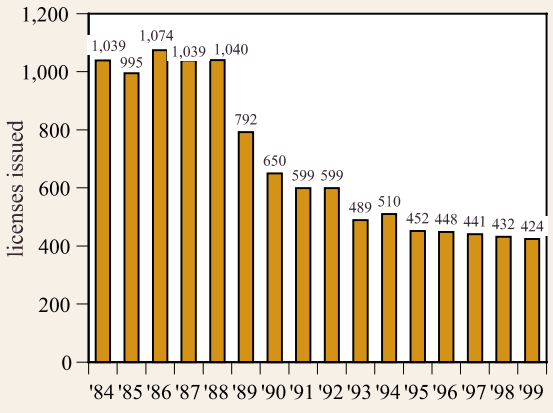
Progress State efforts to protect mussel habitat continue. Eight mussel sanctuaries have been established in the state. Commercial mussel harvesting has also been banned on several waterways including the Cumberland, Green and Barren rivers and in four areas of the Ohio River.

Kentucky's commercial mussels are sustaining viable populations, according to state fish and wildlife officials. However, harvesting of commercial mussels has declined significantly. During 2000, 24,367 pounds of mussels were harvested from lakes and rivers, down from 2,706,731 pounds in 1995. Most mussels harvested in Kentucky are purchased for the cultured pearl industry in Japan. Kentucky mussel shells are used as seeds for cultured pearls. The decline in commercial mussel harvests in Kentucky is directly at-

Measure 1. Federally Threatened and Endangered Fish & Mussels in Kentucky

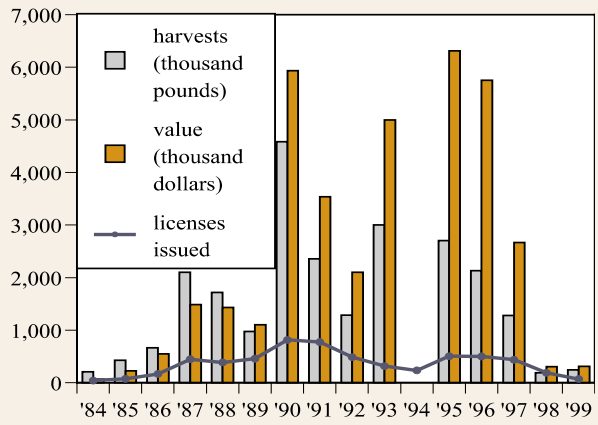


Measure 2. Commercial Fishing License Trends in Kentucky



Fish & Mussels

Measure 3. Commercial Mussel Harvesting Trends in Kentucky



tributed to an epidemic that has killed millions of akoya pearl oysters and slashed production in Japan's pearl culturing areas by 45 percent since 1996. After several years of scientific investigation, the specific cause of the oyster disease remains a mystery.[3] The most prevalent notion is that the culprit is a virus. It is uncertain when and if the akoya pearl industry will recover.

Illegal poaching of mussels remains a problem in Kentucky. Efforts to catch and prosecute violators are ongoing. In 2000, 27 citations were issued by state law enforcement officials for illegal harvesting of mussels.

Pollution is also affecting the state's million dollar commercial fishing industry. For the eighth consecutive year, a fish consumption advisory has been issued along the 664-mile stretch of the Ohio River bordering Kentucky. The Ohio is a major commercial fishing river. Commercial fishing licenses show a declining trend, reaching their lowest level in 15 years in 1999. Commercial fishing is expected to continue to decrease on open bodies of water and increase in aquaculture settings. There are currently 194 aquaculture operations in Kentucky, including growers, producers and pay lakes.[4] Kentuckians consume an estimated 60 million pounds of seafood per year. Less than 4 percent of the seafood consumed in Kentucky is produced in the state.[5]

Footnotes

1. "Freshwater Mussels," by M. Lynne Corn, Congressional Research Service, Publication 94-560 ENR, July 14, 1994.

2. Ibid.

3. What's Killing the Oysters," by Peter Tyson, Nova Online, Web site - http://www.pbs.org/wgbh/nova/pearl/oysters.html, November 2000.

4. Includes live hauling, producers, growers, commercial pay lakes, processors, suppliers and dealers as listed in the Kentucky Aquaculture Directory, Ky. Department of Agriculture, March 2001.

5. Kentucky Aquaculture Association, Web-site - http://www.kentuckyaquaculture.com/page3.html.

Measures - notes and sources

***Measure 1**. Source: Ky. State Nature Preserves Commission.*

***Measure 2**. Source: Ky. Department of Fish and Wildlife Resources.*

***Measure 3**. 1994 harvest and value data not available. Source: Ky. Department of Fish and Wildlife Resources.*

Indicator 16. Rare Birds

Background Kentucky has a rich diversity of birds. Some 350 native species of birds are found in Kentucky (168 of which nest or breed in the state), adding to the state's biological diversity and our quality of life. But 29 percent of the native bird species in Kentucky are considered rare.

The population of birds rises and falls due to a number of complex factors, including weather, pollution, food supply and changes in land use. The Breeding Bird Survey for Kentucky reveals that 25 of the 69 bird species with a statistically valid sample size show a long-term (33-year) decline in populations, while 21 species are increasing and 23 show no significant change.[1]

One of the most significant factors in the decline of many migratory songbird species is habitat loss. For some species, such as the Cerulean warbler, which has declined an average of 5.9 percent annually for the past 30 years, loss and fragmentation of breeding grounds (mature hardwood bottomland forests) and wintering habitat (tropical forests of South America) have contributed to the decline. Some grassland birds, like the Grasshopper sparrow, may also be declining in Kentucky due habitat loss and conversion of grassland to row crops. Approximately 14 percent of the 350 native bird species in Kentucky are considered rare.

At a Glance

Number of native bird species in Kentucky 350

Number of bird species at risk. 49

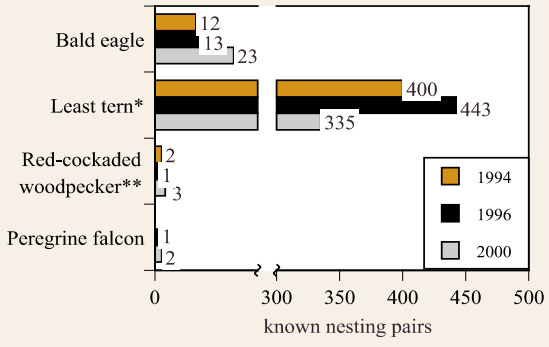
Goal Enhance, restore and protect wildlife diversity and support sustainable use.

Progress Efforts to restore threatened and endangered bird species in Kentucky continue with mixed results. One of the most successful bird recovery efforts to date has been the bald eagle. The banning of the pesticide DDT and laws to protect habitat and prohibit hunting are credited for the comeback of the bald eagle. Nationwide efforts have been so successful that the status of the bald eagle has been upgraded from endangered to threatened.[2] There are now 5,748 nesting pairs of bald eagles nationwide, up from 417 in the 1970s. In Kentucky, there are 23 nesting pairs of bald eagles located in western counties of Ballard, Carlisle, Fulton, Henderson, Hickman, Hopkins, Lyon and Trigg. In 2000, Kentucky also saw the first successful nesting pair of bald eagles in eastern Kentucky.

Another restoration success story is the osprey. Between 1981 and 1991, 133 osprey were released at Land Between the Lakes, Laurel Lake and other sites. Osprey is considered on the road to recovery with 25 active nests in 2000. Efforts are also underway to bring the peregrine falcon back to Kentucky. Between 1993 and 1999, 82 falcons were released in downtown Lexington, at the Kentucky Utilities Ghent Power Plant in Winchester, and at the E.W. Brown Power Plant at Lake Herrington. State fish and wildlife officials plan to release more falcons in 2001 in rural areas along cliff lines with the goal of establishing at least three breeding pairs in the state. A pair of falcons from restoration efforts in nearby states has taken up residence in Louisville and has successfully bred there since 1995. As of 1999, the American peregrine falcon is no longer listed as federally threatened or endangered.

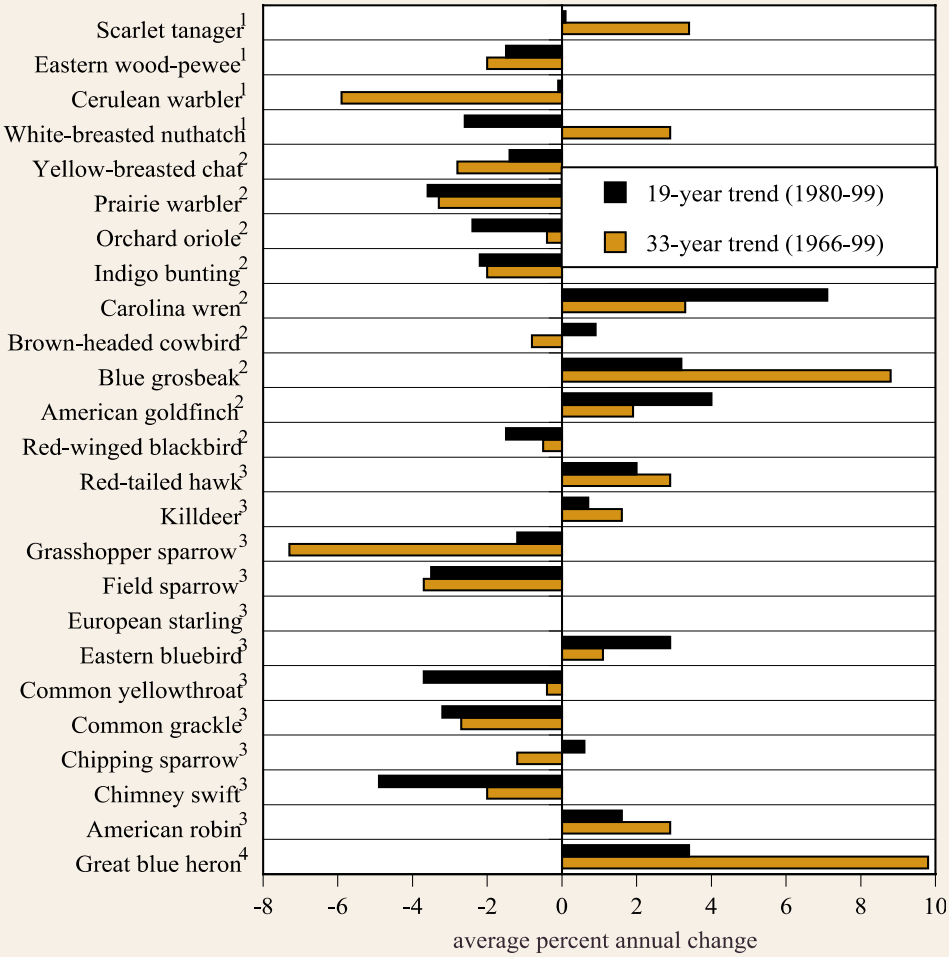
Efforts to restore other bird species in Kentucky have not been as successful. The U.S. Forest Service initiated measures to improve the chances for recovery of the red-cockaded woodpecker with measures to enhance the bird's mature pine-grassland community on the Daniel Boone National Forest. Among the measures used were prescribed fire and the removal of midstory trees. The number of red-cockaded woodpeckers increased to 23 (including 3 nesting pairs), due in large part to a reintroduction program.

Measure 1. Federally Endangered and Threatened Bird Species in Kentucky



Rare Birds

Measure 2. Selective Bird Population Trends in Kentucky



However, extensive damage to roosting trees in the southern Cumberland Plateau by an infestation of southern pine beetles in 1999 and 2000 has forced the U.S. Fish and Wildlife Service to move all red-cockaded woodpeckers from Kentucky to the Sandhills National Wildlife Refuge in South Carolina and the Ouachita National Forest in Arkansas. Plans are being developed to restore lost habitat and return the bird to Kentucky's forests in the future.[3]

Footnotes

***1**. The best overall data on bird population trends in the state are collected as part of the national North American Breeding Bird Survey. While the survey is limited by several factors, including limited sample size for certain species, it still serves as an important tool to identify native bird species at risk.*

***2. "**The Bald Eagle is Back!," U.S. Fish and Wildlife Service, press release 7/2/00. Web site - http://www.fws.gov/r9extaff/eaglejuly2.html.*

***3**. "Federal and State Partners to Rescue Red-cockaded Woodpeckers from Daniel Boone National Forest," U.S. Fish and Wildlife Service, press release, March 7, 2001.*

Measures - notes and sources

***Measure 1**. Species with statistically significant long-term or short-term trends. 1. Woodland habitat. 2. Brush/mixed habitat. 3. Farm/open land habitat. 4. Water/marsh habitat. Source: U.S. Fish and Wildlife Service Breeding Bird Survey, Ky. State Nature Preserves Commission.*

***Measure 2.** Earlier and historic data not available. *Based on site surveys and estimates. Source: Ky. Department of Fish and Wildlife Resources, U.S. Forest Service.*

Indicator 17. Waterfowl and Wetlands

At a Glance

Wetland acreage in Ky.
original. . . . . .1.6 million
current 360,000

Number of resident wild ducks
1970 156,983
1980 50,960
1999. 47,033

Number of resident Canada goose
1993 18,000
1999 46,395

Background Habitat loss is considered one of the greatest threats to native species. Ecological communities that provide habitat to animals and plants have undergone significant change in the past two centuries, affecting populations and the range of a number of native species.[1] Nowhere is the alteration of our natural landscape more apparent than in the loss of wetlands. Historical data shows that at one time more than 220 million acres of wetlands existed in the United States. More than 50 percent of those wetlands have since been destroyed to make way for farms, roads and homes.[2] In Kentucky, 75 percent of the 1.6 million acres of original wetlands have been converted to other uses. Wetland ecosystems provide critical habitat for many species of wildlife and plants including a wide variety of ducks and geese. Waterfowl is considered one of the most prominent and economically important groups of migratory birds of the North American continent. The economic benefits of waterfowl in the United States is estimated to exceed more than $100 billion a year.[3]

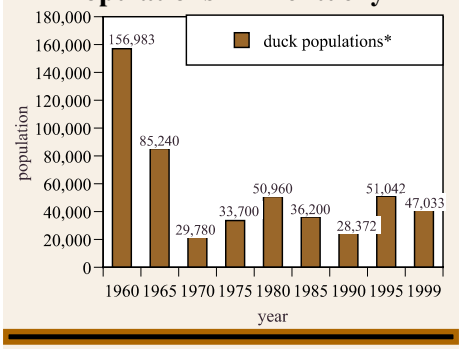
Goal Enhance, restore, and protect wildlife diversity and support sustainable use.

Progress The loss of wetlands can be attributed to a decline in waterfowl populations in Kentucky. But efforts to protect wetlands in Kentucky and important wintering grounds in Canada have helped to stabilize waterfowl populations. In fact, Kentucky has become home to a growing number of resident Canada geese. Flocks of geese were established from releases that occurred in the state during the 1970s and early 1980s. Canada geese populations are now estimated at 46,395.

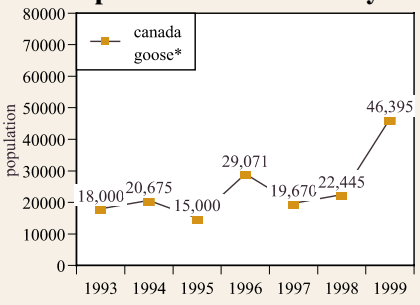
In 1991, a nationwide policy of no net loss of wetlands was adopted to halt the conversion of wetlands to other uses. Federal and state regulations require that for every acre of wetland destroyed, two or more acres must be created. In Kentucky, 1,433 acres of wetlands were converted to other uses, and 3,299 acres were created or restored between 1991 and 2000. While this has resulted in a overall net increase in wetland acreage, the loss in function of a mature wetland versus a newly restored or created one is considerable, according to biologists. It is estimated that it may take 40 years before a wetland is fully functional.

Another national initiative to conserve wetlands is the federal Wetland Reserve Program. Under this program, the federal government compensates farmers who set aside original wetland acreage. Currently, more than 1 million acres of wetlands are enrolled in the program nationwide—7,459 acres of which are in Kentucky.[4] Federal efforts are also underway to purchase 20,000 acres along the East Fork of Clarks River in western Kentucky to create the state's first national wildlife refuge. Clarks River is one of the few remaining unchannelized bottomland hardwood wetland ecosystems in Kentucky and is an important migratory bird flyway. To date, 5,600 acres have been acquired at a cost of $1.5 million.

Measure 1. Wild Duck Populations in Kentucky



Measure 2. Canada Goose Populations in Kentucky



Footnotes

1. Kentucky Alive, Report of the Kentucky Biodiversity Task Force, 1995.
2. "North American Waterfowl Management Plan," U.S. Fish and Wildlife Service, 2000, Web site - http://birdhabitat.fws.gov/NAWMP/nawmphp.htm.
3. Freshwater Ecosystems Services, Sandra Postel and Stephen Carpenter, Island Press. Washington D.C., 1997.
4. "Total WRP Acres Enrolled," U.S. Department of Agriculture, Wetland Reserve Program, March 2001.

Measures - notes and sources

Measure 1. **Based on midwinter five-year averages. Source: Ky. Department of Fish and Wildlife Resources.*
Measure 2. **Resident Geese Population. Source: Ky. Department of Fish and Wildlife Resources.*

Bats & Cave Ecosystems

Indicator 18. Bats and Cave Ecosystems

At a Glance

Number of caves in Kentucky 6,700

Gray bat population
1983. 230,000
1991. 200,000
1999. 225,000

Virginia big-eared bat population
1983 1,200
1991 3,700
1999. 5,100

Indiana bat population
1983 74,000
1991 59,000
1999 31,000

Background One of the most fragile and unique ecosystems in Kentucky is its caves. The number of known Kentucky caves is now estimated at 6,700, and they are found in 87 of Kentucky's 120 counties.[1] The caves of the Pennyroyal and Bluegrass regions represent one of the major concentrations of these unique ecosystems in the United States and world.[2] For example, Mammoth Cave in Edmonson County is the most extensive cave ecosystem in the world, housing 200 species of plants and animals.

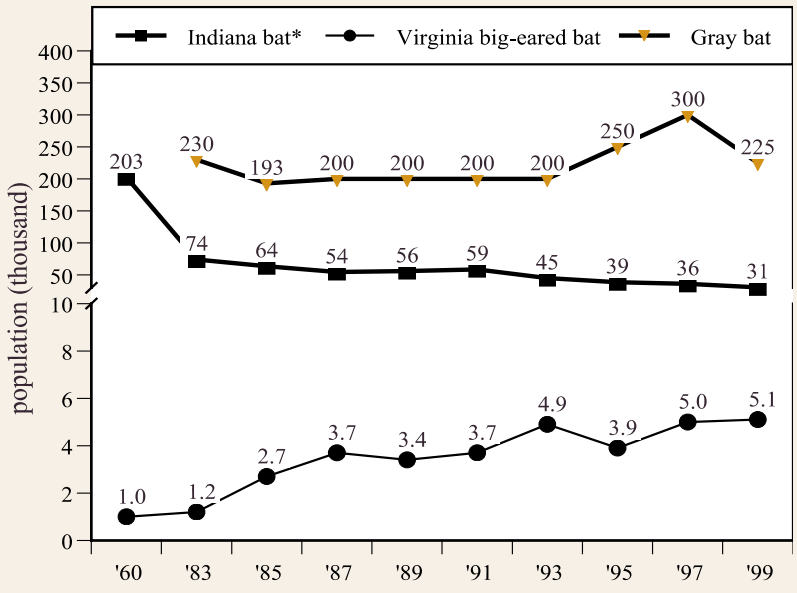
Pollution and other disturbances, however, have altered many caves and impacted populations of many species dependent upon these ecosystems. This is particularly the case for bats. Of the 45 species of bats found in the continental United States, six are federally listed as threatened or endangered under the Endangered Species Act of 1973. Three of these species occur in Kentucky—the Gray bat, the Indiana bat, and the Virginia big-eared bat. The decline in bat populations is linked to the destruction or vandalism of caves, disturbance of hibernating and maternity bat colonies, direct killing of bats and the use of pesticides and other chemical toxicants on the bat's food sources.

Goal Enhance, restore and protect wildlife diversity and support sustainable use.

Progress To date, more than 3,800 caves in Kentucky have been mapped.[3] Many of these caves are home to the state's 16 native species of bats.

Federal and state efforts to gate and protect caves have assisted in protecting bat habitat and helped to restore populations of some species of rare bats. For example, 81 percent of historic gray bat population has been lost in Kentucky.[4] However, nationwide efforts to protect the bat's habitat has resulted in an increase in the gray bat population. Kentucky has also witnessed an increase in the gray bat population, although during the past year populations have declined. It is hoped that gray bat populations will continue to increase in Ken-

Measure 1. Federally Threatened and Endangered Bat Populations in Kentucky



tucky with the gating of the bat's primary hibernation cave and the purchase and management by government agencies of maternity caves in Allen, Adair and Hart counties.

Populations of Virginia big-eared bats are increasing at both the national and state level. The Virginia big-eared bat's national population is estimated at 18,492.[5] Virginia big-eared bat populations in Kentucky have steadily increased since 1989 after the purchase and protection of cave habitats in Lee County by the U.S. Forest Service and the Kentucky chapter of The Nature Conservancy.

The Indiana bat population is about 400,000 nationwide. More than 85 percent of the population hibernate at seven locations—two caves and an underground mine in Missouri, two caves in Indiana and two caves in Kentucky. The nation's Indiana bat population has decreased by more than 34 percent since 1983, while the Kentucky population has dropped by 58 percent.[6] The decline is attributed to commercialization of roosting caves, killing of bats by vandals and human disturbance caused by the growing number of spelunkers.

Footnotes

1. Kentucky Alive, Report of the Kentucky Biodiversity Task Force, 1995.
2. Ibid.
3. Kentucky Geological Survey. Caves and Karst of Kentucky, 1985
4. "Threatened and Endangered Species-Gray Bat," Arkansas Game and Fish Commission, Web site - http://www.agrc.com/threatened/bat-gray.html, and the Ky. Department of Fish and Wildlife Resources.
5. Ky. Department of Fish and Wildlife Resources.
6. Ky. Department of Fish and Wildlife Resources.

Measures - notes and sources

***Measure 1**. *Based on bat populations at three primary caves - Bat Cave (Carter County), Hundred Dome and Dixon Caves (Edmonson County). 1997 populations include estimated loss of 3,000 bats due to floods. Source: Ky. Department of Fish and Wildlife Resources.*

Indicator 19. Game Species

At a Glance

Number of wild turkey in Kentucky
1959 800
1999. 140,000

Number of white tail deer in Kentucky
1940. 2,000
1999. 693,000

Background Some of the most successful wildlife restoration efforts in Kentucky have been for game species of wildlife. For example, in the early part of the 20th century, nearly all deer and wild turkey were eliminated from Kentucky, the result of over hunting and habitat destruction. Since then, these animals have been restored to near-record levels.

Goal Enhance, restore and protect wildlife diversity and support sustainable use.

Progress In 1959, only 800 wild turkeys were known to exist in Kentucky. Since 1978, 6,750 turkeys have been released at 430 sites across the state. By 1999, turkey populations had increased to 140,000. State officials estimate that wild turkey populations will likely peak in the next 10 years at 200,000 to 250,000 birds.

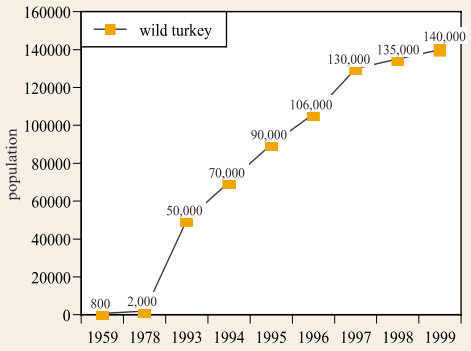
White tail deer populations in Kentucky reached an all-time high in 1999 at 693,000. This is a significant increase since 1940, when unregulated hunting reduced the deer population to 2,000. The distribution of deer ranges from a low of 3.41 deer per square mile in Leslie County to a high of 67.25 deer per square mile in Franklin County. The largest concentrations of deer are in the west central region of the state. State officials estimate that sustainable deer populations could reach as high as 1.7 million; however, the state goal is a population not to exceed 807,000.

The state also monitors populations of three other popular game species—grouse, cottontail rabbit and quail. Long-term trends reveal that populations of quail and rabbit have steadily declined between 1970 and 1980. The decline in the rabbit and quail population is largely attributed to the loss and degradation of habitat. In addition, the planting of tall fescue 31, the dominant vegetation on hay and pastureland, has impacted populations since the grass offers little nutritional or nesting benefits to rabbit and quail. More recent trends, however, reveal an increase in rabbit and quail populations. State wildlife officials have not yet determined why these populations have increased.

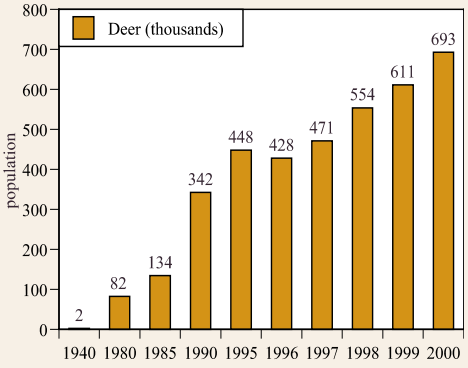
Grouse populations are declining in southern Appalachian states based on long-term monitoring data. Grouse populations have been declining in recent decades due to a loss of habitat. Grouse thrive in young forests, so, given the intensive logging of Kentucky's forests, grouse populations are expected to increase as new forests regenerate.

State efforts to restore elk populations began in 1997. To date, 912 elk have been released in eastern Kentucky. The state population of elk is now estimated to be 1,065. The first modern-day elk hunt in Kentucky will be held in 2001 near Hazard.

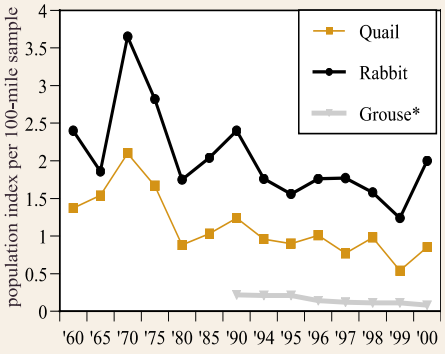
Measure 1. Wild Turkey Populations in Kentucky



Measure 2. White Tail Deer Populations in Kentucky



Measure 3. Quail, Rabbit and Grouse Populations in Kentucky



Measures - notes and sources

Measure 1. *Source: Ky. Department of Fish and Wildlife Resources.*

Measure 2. *Source: Ky. Department of Fish and Wildlife Resources.*

Measure 3. **Field surveys at grouse drumming route listening posts. Source: Ky. Department of Fish and Wildlife Resources.*

Indicator 20. Protection of Natural Areas

Background Kentucky's beautiful landscape and wealth of wildlife are among the most varied in the eastern United States.[1] Today, only scattered remnants of undisturbed natural landscape remain as testimony to our natural heritage. For the past 25 years, the Kentucky Nature Preserves Commission has been inventorying the state for natural areas. The information collected is essential to understanding the state's biodiversity and identifying opportunities to balance conservation with human needs. Inventories have been completed in 27 counties and are underway in 38 counties.

An estimated 1,526,985 acres of land, about 6 percent of the total state acreage, are in public ownership.[2] But the level of protection of these lands varies. For example, only 107,996 acres of these lands (0.4 percent of the state's acreage) are considered fully protected. These include 40 state nature preserves, federal wilderness areas, national parks, conservation organization-owned land and land owned by private nonprofit organizations. Other public lands in Kentucky are identified as managed but not necessarily protected from human disturbance. These include 33 state wildlife management areas, university lands, state parks and most of the 695,000 acres of the Daniel Boone National Forest.

At a Glance

Acres of land in Kentucky . . .25,469,094

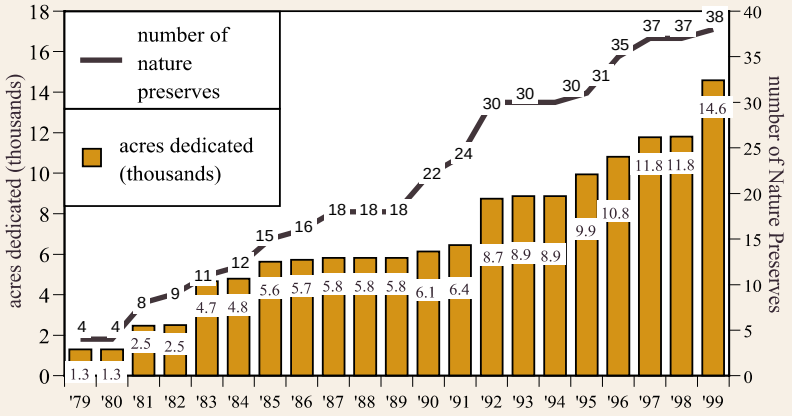
Land under public ownership (acres)
managed 1,526,985
fully protected 107,996

Goal To purchase and protect selected natural areas of the Commonwealth; to protect rare and endangered species and migratory birds; to save threatened areas of natural importance; and to provide natural areas for public use, outdoor recreation and education.

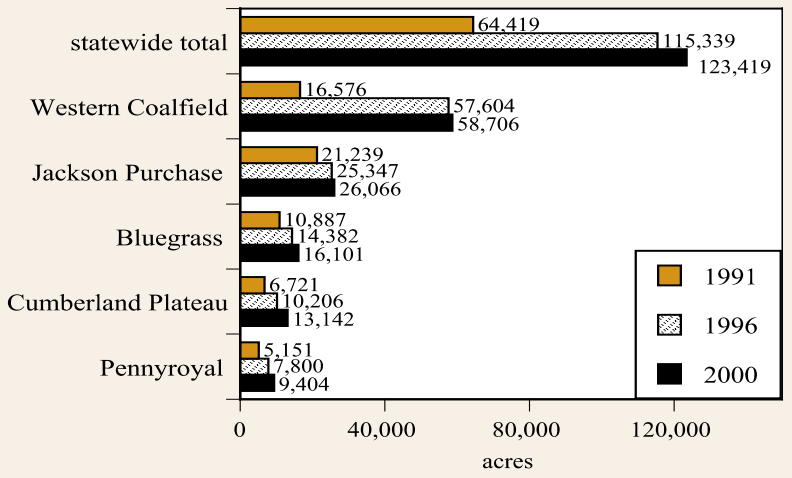
Progress Kentucky has primarily relied on the generosity of its citizens and periodic funds from the state and the federal government to protect important natural areas. The only funding source for many years was donations made to the Kentucky Income Tax Checkoff Program, Nature and Wildlife Fund.

In recent years, Kentucky has made great strides to improve the protection of natural areas. The Kentucky Heritage Land Conservation Fund was created in 1990 and funded in 1994 to provide a permanent source of monies to purchase natural areas from willing sellers. The fund is financed by revenues from the state portion of the unmined minerals tax, environmental fines, the sale of nature license plates and interest earned on undistributed funds. The sale of 18,243 nature license plates has generated $1,902,232 since 1995 and has become one of the most popular specialty license plates in the state. The yearly fluctuations

Measure 1. Kentucky Nature Preserves

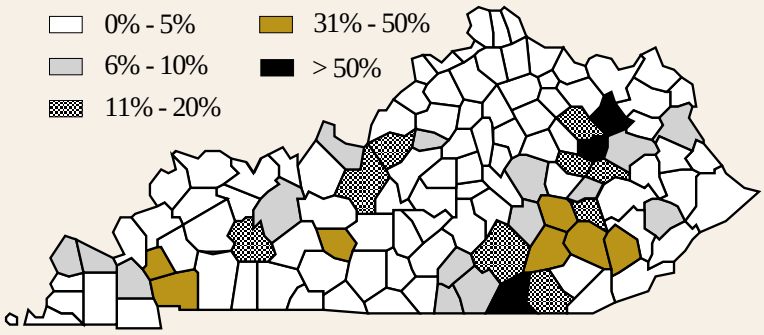


Measure 2. Kentucky Wildlife Management Areas

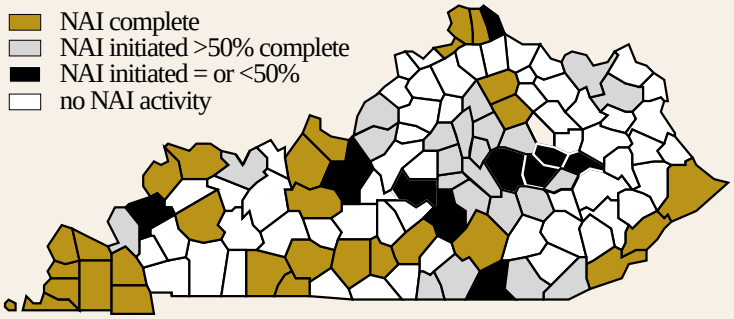


Natural Areas

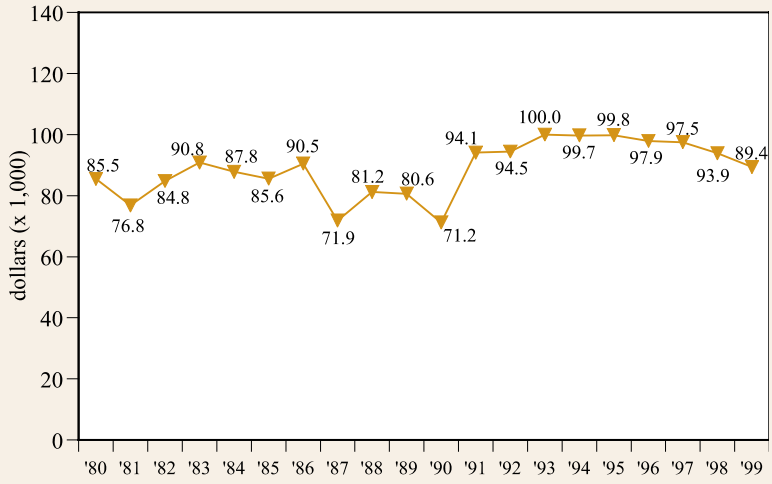
Measure 3. Percent Land Area in Public Ownership (2000)



Measure 4. Status of the Natural Areas Inventory (2000)



Measure 5. Donations to Kentucky Income Tax Wildlife Checkoff Program



of the Heritage Land Conservation Fund are attributed to a backlog in the collection of the unmined minerals tax. Since 1995, the program has funded 37 projects to protect 9,200 acres in 43 counties at a cost of $7.6 million.

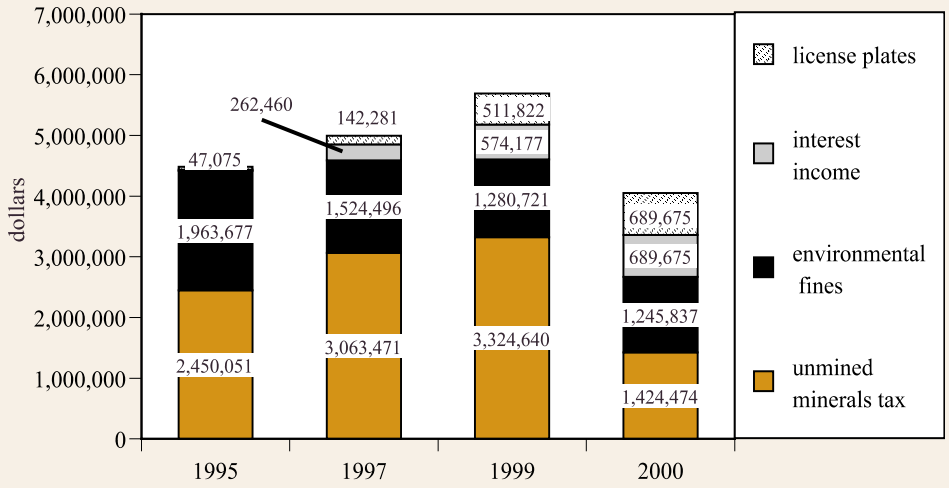
Private landowners are also working to protect natural areas. The Kentucky State Nature Preserves Commission administers the Kentucky Natural Areas Registry to recognize owners of outstanding natural areas for their commitment to preserving Kentucky's natural heritage. The program is a voluntary nonbinding agreement that encourages landowners to continue their stewardship. Forty-five landowners have registered 44 sites totaling 4,367 acres. The Kentucky Department of Fish and Wildlife Resources also works with numerous private companies and landowners to manage wildlife on their land.

The protection of Black Mountain has stood out as one of the most important initiatives in recent years to conserve our natural resources. The mountain is located in southeastern Kentucky in Harlan County and, at 4,145 feet, is the tallest peak in the state. It is also one of the most ecologically diverse place, with 54 different species of animal and plant life. In 2000, the state agreed to purchase the mineral and timber rights at the top elevation of the mountain (above 3,800 feet) from private parties at a cost of $4.2 million. The historic agreement will ensure the mountain is protected for future generations of Kentuckians.

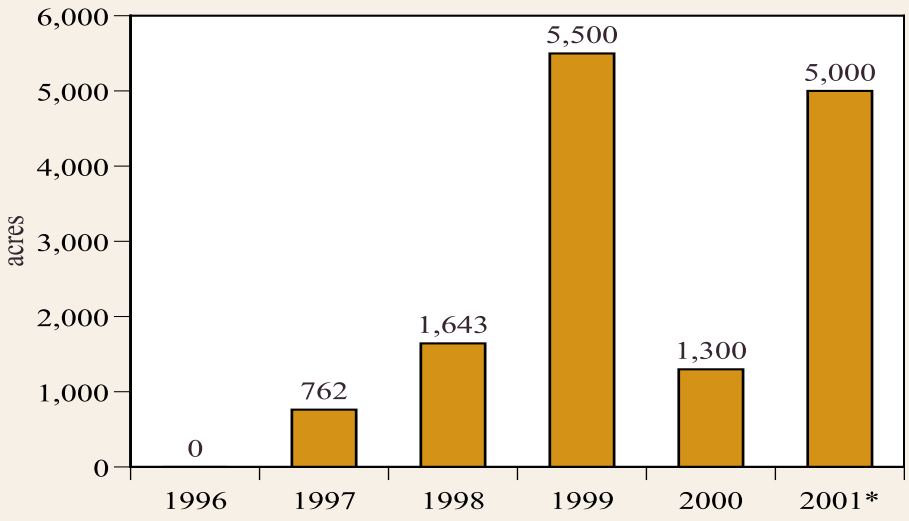
Footnotes

1. Kentucky Alive, Report of the Kentucky Biodiversity Task Force, 1995.
2. Ky. Department of Fish and Wildlife Resources, 2000.

Measure 6. Kentucky Heritage Land Conservation Fund



Measure 7. Kentucky Heritage Land Conservation Purchases



Measures - notes and sources

Measure 1. *Source: Ky. State Nature Preserves Commission.*
Measure 2. *Source: Ky. Department of Fish and Wildlife Resources.*
Measure 3. *Source: Ky. Department of Fish and Wildlife Resources.*
Measure 4. *Source: Ky. Nature Preserves Commission.*
Measure 6. *Source: Ky. Heritage Land Conservation Fund Board.*
Measure 7. **As of May, 2001. Source: Ky. Heritage Land Conservation Fund Board.*